



The Collection and Analysis of Community Data

WFS Seminar on Collection and Analysis
of Data on Community and Institutional
Factors
20–23 June 1983

Editor

John B. Casterline

International Statistical Institute
World Fertility Survey

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Preface

Few would query the proposition that demographic decisions are heavily influenced, one way or another, by the community or social setting in which those concerned find themselves, to the extent that failure to take account of such factors renders attempts to paint the picture of the demographic scene seriously incomplete. The difficult question is, how can relevant information be collected and analysed so as to facilitate an understanding of the nature and extent of this influence?

WFS recognized the need by commissioning preparatory work carried out by Professor Ronald Freedman and published it as *WFS Occasional Papers* no 8 (Community-Level Data in Fertility Surveys) and *WFS Occasional Papers* no 9 (Examples of Community-Level Questionnaires). Based upon this material, an optional community-level questionnaire was prepared which was designed to be administered by approach to local community leaders and was to be separate from the household and individual interviews.

The module was used in 17 participating developing countries. The data have been used in many of the national analyses and in several projects undertaken by the WFS London headquarters, in particular the Workshop on Community Factors in Infant and Child Mortality held March–June 1983 in which representatives from Bangladesh, Cameroon, Ecuador, Egypt, Ivory Coast and Peru participated.

In view of the exploratory nature of the work and the rapid expansion of research on community factors in recent years, it was thought appropriate to convene

an international seminar to review the methodology used and the results obtained, and generally to evaluate the experience, with a view to drawing lessons for future work in the field. Such a seminar was held in London on 20–23 June 1983. The present volume gathers together the material presented at the meeting, in the form of presented papers, contributions by discussants and working group reports, together with summaries of organization and conclusions.

The discussions at the seminar brought out clearly the shortcomings of the WFS approach in this field. It was, however, common ground that the aim was worthy and the effort commendable. I am sure that the meeting served its purpose of providing another and useful step towards clarification of the conceptual issues involved and resolution of the formidable problems of classification and measurement.

I am very grateful indeed to all those who participated in this meeting (see appendices A and C) and who contributed to its deliberations. I would in particular like to express my appreciation of the efforts of John Casterline who has put in much work on the handling of community data from WFS surveys and who not only mapped out much of the ground before the seminar but also, as editor, has overseen the preparation of this record of proceedings. I would also like to thank Kathryn Swift for her assistance in preparing the text for the printer.

HALVOR GILLE
WFS Project Director

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Note on References

The place and name of publisher for World Fertility Survey publications, and International Statistical Institute publications generally, are:

Voorburg, Netherlands: International Statistical Institute.

This material is not repeated in individual references. However, 'ISI' is added in cases where the provenance of a work might not otherwise be clear.

Administration and Organization

The World Fertility Survey (WFS) Seminar on the Collection and Analysis of Data on Community and Institutional Factors took place at the Grosvenor Hotel in London on 20–23 June 1983.

The objectives of the Seminar were:

- to assess the WFS community module
- to present results from research on community effects on demographic behaviour
- to make recommendations for future data collection and analysis.

At appendix A is a list of participants in the Seminar. These include participants in the WFS Workshop on Community Factors in Infant and Child Mortality which had been held in London over the preceding three months. In addition, certain other WFS staff participated in the five working groups (see below); they are included in the list of members of the working groups at appendix C.

The programme of the Seminar is at appendix B. This includes the titles and authors of presented papers. Generally, sessions started with the presentation of papers by their authors, followed by the contribution of discussants and then the floor discussion, with finally opportunity given for replies to points raised. An exception was Session II which in effect procedurally constituted two sessions, one in the morning

and one in the afternoon. Session I concluded with verbal presentations from participants in the workshop, followed by general discussion. Session V was adjourned after presentation of the paper, for the convening of the working groups, which were assigned the tasks of considering the particular topics noted in the programme; membership of the Working Groups is indicated at appendix C. Verbal presentations from the groups were made when Session V reconvened in plenary, followed by the discussant's contribution and then by general discussion.

Subsequent to the Seminar, the authors of the various papers were invited to make revisions to their papers if they so wished, in the light of the discussions in the Seminar, and in addition discussants were invited to submit a written record of their remarks. This material constitutes the bulk of this record of the proceedings of the Seminar which includes also an overall summary of the discussion and the conclusions reached in the Seminar and, in appendix D, notes on the discussions in the Working Groups.

The presentations by the Workshop participants are not included in this present volume. Individual country reports from the Workshop were prepared separately. Those for Bangladesh and Ecuador have been published as *WFS Scientific Reports* nos 56 and 74 respectively; the remaining reports are WFS unpublished manuscripts.

Background, Discussion and Conclusions: A Summary

John B. Casterline

The collection of information on geographical localities in conjunction with a household demographic survey is a relatively new enterprise. The argument for collecting these data is compelling: household surveys typically provide little information about the setting in which demographic decisions are made, yet most theoretical models of fertility, mortality, and migration posit that these decisions are heavily influenced by characteristics of the setting. Relevant characteristics include, for example, the normative context, economic opportunity structures, and the accessibility of health and family planning services. These and other features of the setting of demographic decisions are obviously complex and multi-faceted, and thus not readily measured in a brief cross-sectional survey. The same generalization applies to household and individual characteristics, however, but information on these gathered in cross-sectional surveys has proved of considerable value in improving our understanding of the determinants of demographic behaviour. With the hope that measurement of simple indicators of the community setting would permit investigation of their influence on demographic behaviour, Ronald Freedman proposed collection of such data in *WFS Occasional Papers* no 8 (1974) and illustrated the types of items which might be included in such 'community surveys' in *WFS Occasional Papers* no 9 (1974).

Seventeen countries in the WFS programme collected community data, in all but two countries in rural areas only. The surveys consisted of the completion of a relatively brief questionnaire about each village containing respondents for the fertility survey. As the WFS community surveys represent a significant expansion of our experience in the collection and analysis of data of these types, the time seemed ripe to convene a meeting to assess the experience. Any thorough assessment entails consideration of the theories motivating collection of community data, the design of the questionnaire and fieldwork, the statistical models employed in the analysis, and the findings

from the analysis. The Seminar reviewed all these matters, as reflected in the parts of this volume, but the organization of the review differed from what might be expected. Rather than concluding with consideration of the findings from the analysis to date, the Seminar began with this topic, then proceeded to discussion of theoretical concepts, statistical issues, and survey design. The intention of this organization of the discussion was to encourage a prospective view: the WFS experience represents a point of departure, a basis for improvement and further development of the collection and analysis of community data. The WFS efforts were passes through uncharted territory, and thus not surprisingly suffered from inappropriate planning and misdirection. The objective of the Seminar was not to dwell on these shortcomings, but rather to propose means of enhancing the quality and utility of community data.

Findings from the analysis of WFS data are reviewed in the chapters by Casterline and Tsui (chapters 4 and 5). Country studies utilizing WFS data are provided in the chapters by Alauddin, Engracia, and Lesthaeghe *et al* (chapters 1-3). In addition, during the Seminar initial results were presented from a WFS workshop on differentials in infant and child mortality, in which community data on the proximity of health services were examined in some detail. Reports for the six countries participating in the workshop have been prepared separately (see page xi). The two review chapters, by Casterline and Tsui, and the country studies offer interesting counterpoint. Casterline (on fertility) and Tsui (on contraceptive use) are able to point to only a minority of findings which conform to expectations: in general, community characteristics show weak and inconsistent associations with reproductive behaviour. This summary statement applies to Alauddin's results as well. But Engracia demonstrates substantial impacts of village development and the accessibility of family planning services on contraceptive use in the rural Philippines, and Lesthaeghe *et al* show that the mean level of schooling in localities in

rural Kenya conditions individual behaviour in interesting and complex ways. In the country studies of the association between the proximity to health services and mortality, reviewed in Casterline (1985), significant associations emerge in most of the countries. Casterline (1985) also reports plausible community effects estimated in analyses of data from Egypt and Peru which were not available at the time the papers in this volume were prepared. Thus it would appear that discouragement about the returns from the analysis of WFS data, expressed in the chapters by Casterline and Tsui, and reflected in the discussion throughout the Seminar, was perhaps premature. The more successful recent analysis, in fact, seems to have benefited from lessons learned in the early failures: in particular, the need to specify focused hypotheses which can be tested simply and straightforwardly.

Because analysis of community data seems especially sensitive to the specification of hypotheses, as these affect the construction of indicators and design of the statistical analysis, the theoretical discussions preceding data collection and analysis are of great importance. The chapters in part II by van de Walle, Hermalin, Caldwell and Caldwell, Hobcraft, and Hugo (chapters 6–10) together offer a rich set of propositions which are sensibly addressed using data gathered in community surveys. The optimal means of measuring the factors of interest is not always readily apparent, however. Hermalin concentrates on the relationship between the accessibility of family planning services and contraceptive use; the community-level characteristic – proximity, or density, of services – is in principle measurable through relatively brief surveys. Hobcraft's discussion of the study of mortality also stresses the role of service provision and utilization, but he also touches on a variety of other macro factors, such as the disease environment and normative responses to disease, for which indicators probably could be developed from both household and community survey data. The same cannot be said of the normative and marriage market factors singled out by van de Walle as fundamental determinants of nuptiality patterns, nor the social networks affecting migration decisions described by Hugo. Caldwell and Caldwell, in their inventory of determinants of factors other than contraception and nuptiality affecting fertility, identify few factors which one could imagine measuring in WFS-type community surveys. As in the case of nuptiality, measurement of normative factors would seem of first priority, but this probably requires different data collection approaches than used in the past.

The papers in part II begin with theoretical concerns but, inevitably, move to measurement problems.

Similarly, the analyses contributed by Verma (not reproduced in this volume) and Blalock (chapter 12) in part III about sampling and statistical issues quickly become engaged in theoretical and measurement deliberations. Verma argues that, where a community survey is planned, this fact should be taken into account in the construction of the sample frame, in particular the choice of the types of units to serve as primary and secondary sampling units. Ideally these should correspond with meaningful social and economic units, but frequently this will not be feasible. The main point is that difficult substantive questions – how do we define the social groupings which affect demographic decisions? – enter the process of sample design when a community survey is contemplated. Blalock's chapter ranges very broadly over topics pertinent to multi-level analysis, the approach adopted in most of the research utilizing WFS community survey data. As throughout his work, Blalock stresses that problems of statistical analysis cannot be extricated from conceptualization and measurement issues. This is probably no more true of multi-level analysis than of other types of analysis. But because of the recency of serious work in this area the fundamental problems are in the process of being defined and resolved, and thus acceptable solutions have yet to be integrated into the working tools of the analyst. Blalock's paper succinctly reviews many related issues confronting the analyst.

WFS community data have been gathered in one-visit surveys carried out simultaneously with the household survey and the individual fertility survey. Chapter 17 by Nizamuddin in part IV discusses the strengths and weaknesses of this approach, with special reference to the author's experience with the WFS community survey in Pakistan. Nizamuddin expresses scepticism about the value of collecting more detailed social and economic data in this type of survey, but he argues that the data collection can be much improved. Most of his suggestions are encompassed by the recommendations of Chayovan and Knodel (chapter 15), who draw on recent non-WFS experience in Thailand. Chayovan and Knodel persuasively argue that some simple modifications in the procedures followed in the survey design and fieldwork can substantially improve the validity of the data. In their Thai study Chayovan and Knodel collect some of their data directly from local health clinics, a practice consistent with Nizamuddin's suggestion that more use be made of data from other sources, such as censuses or administrative records. This may not always be easily accomplished. Werner describes problems encountered in attempting to obtain community measures by linking data from various sources in a rather special circumstance, where several surveys have utilized the same

sample frame. Community measures created by aggregation of survey items would seem an ideal way to make full use of the data from the multiple surveys, but Werner's efforts to do this in Keyna ran against many unforeseen obstacles which no doubt would often emerge elsewhere (see chapter 16). All of the papers in part IV contain recommendations for improved data collection along with acknowledgement that the description of the community setting provided by the data collected in WFS-type surveys will inevitably be limited and incomplete. This latter point is made most forcefully by Cain (chapter 14), who, after describing his unsatisfactory experience in assisting in the design of the Bangladesh WFS community survey, discusses the reasons why his own research interests have led him to rely heavily on intensive village studies.

All the papers in the volume contain implicit or explicit suggestions about the design of community questionnaires. A plethora of suggestions is to be expected: community questionnaires should be varied in content, adapted to societal settings and research interests. A diverse set of proposed items are contained in Bilsborrow's chapter in part V (chapter 19) of the volume. Further suggestions are offered in the working group reports reproduced in appendix D. Both Bilsborrow's chapter and the reports reflect the state of the art in design of community questionnaires. Most developed, probably because it is most straightforward, is inquiry about the accessibility of facilities and services. (Note that the working group proposes means of measuring aspects of accessibility other than geographical proximity *per se*.) Least developed are means of measuring the political, social structural, and cultural features of the community setting and indeed the consensus view of the Seminar participants seemed to be that this is not likely to be achieved in brief community surveys.

In the final chapter of the volume Freedman offers a summary review of the major conclusions of the Seminar. His paper serves not only as a source of specific recommendations for future work but also expresses the mood of the Seminar discussion on many topics. As Freedman notes, there is a seeming contradiction in the generally negative evaluation of the returns from analysis of the WFS community data and the enthusiasm of many participants for further community data collection in conjunction with national demographic surveys. The explanation for this apparent inconsistency is a conviction about the potential importance of these data and confidence that in the design and fieldwork for such surveys the WFS experience can be qualitatively improved on. For the latter, Freedman assembles a set of suggestions, all of which are feasibly implemented at relatively low cost.

Because community survey data provide a direct and convenient means of investigating some central theoretical and public policy concerns, the proposal to continue, and perhaps expand, the collection of these data in future surveys is sensible. One cannot deny that expected relationships often have not appeared in the analysis of WFS data. This can be taken as grounds for cutting back rather than expanding efforts in this area: the types of variables readily measured have been tested and shown to be unimportant, one could argue. A view expressed several times during the Seminar was that if the village factors examined were important determinants of demographic behaviour, significant associations would have emerged, despite the shortcomings of the measurement and analysis. But this seems a shortsighted view: the theoretical and policy issues are continuing concerns, demanding continuing investigation; the sensitivity of the results to date to the shortcomings in measurement and analysis is not known; and the results themselves are far from uniform, with rather strong effects of community factors estimated in several societies (Egypt, Peru, the Philippines).

While rejection of the potential value of these data seems unfounded, appreciation of their limits is entirely in order. Two points which emerged repeatedly in the Seminar emphasize this. First, where features of the community setting are in part determined by the individual characteristics which are dependent variables in the analysis, estimated effects of the community factors on the individual variables are clearly misleading (unless the mutual causation is somehow taken into account). An example of this circumstance would be establishment of contraceptive outlets in response to demand; that is, accessibility of family planning services as a function of demand for them. The apparent effects of community accessibility on individual use are then in part a consequence of the effects of individual demand for contraception on accessibility. In circumstances of this type, either more complex estimation approaches are required to capture the relevant dynamics operating, or one must rely on alternative research strategies, such as experimental designs.

A second topic of much discussion in the Seminar was the nature of the social process of fertility transition. How do couples come to know about contraception, to consider it acceptable to use, and finally to adopt? Who are the relevant actors? Fertility transitions in contemporary populations occur with a rapidity that resembles a 'contagion' process: are we witnessing social imitation, normative change, or simply diffusion of information (knowledge about family limitation)? Without a clearer picture of the

social process of transition, it is difficult to answer these questions, which are critical for our understanding of the causes and timing of previous transitions and the failure of transitions to occur elsewhere. This is a topic for which household survey data are not well-suited; nor do the community survey instruments in hand contain much of relevance. Development of research strategies in this area is much needed, and will be motivated by the same general concerns which motivate further development of community survey data collection and analysis: the desire to identify the

features of the social, economic, and cultural setting influencing demographic decisions.

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Casterline, John B. (1985). The Collection and Analysis of Community Data. In J.G. Cleland and C.S. Scott, eds *The World Fertility Survey: an Assessment*. Oxford: Oxford University Press.

Part I

Overview of Findings from the Analysis of WFS Community Data

1 Community Factors in Contraception among Bangladeshi Rural Women

Mohammad Alauddin

1.1 INTRODUCTION

Our knowledge of determinants of fertility and contraceptive practice differentials is largely based either on micro-level individual data or macro-level national data. But fertility studies based solely on either individual-level data or national-level, aggregate data have limitations.

The individual studies have sought to explain differential fertility regulation behaviour of individuals – mostly wives or, at best, individual couples – by their socio-economic, psychological, and demographic characteristics. A number of studies reveal the incidence of this approach in the field of population/family planning and KAP studies (see Freedman 1975; Hawthorne 1970). These studies have usually taken the woman in isolation and tended to exclude the larger family, community, and ecological contexts of the reproductive behaviour. The implicit assumptions seem to be that (1) the variations of fertility and responses to fertility regulation programmes are due to the characteristics that lie within the individual and (2) the socio-economic conditions and ecological contexts of the community in which the individuals live are uniform and have invariant effect, if any, on the individuals.

The studies based on national-level, aggregate data assume the local communities to be homogeneous with respect to social, cultural and economic conditions, input of development programmes and services, degree of willingness to accept innovations, and the availability of local institutions and agencies to implement family planning programmes. Clearly, these assumptions are as untenable as the assumptions implicit in strictly individual-based studies.

1.2 ADDITION OF COMMUNITY VARIABLES IN FERTILITY RESEARCH

As a way of overcoming the limitations of these one-

sided approaches, Freedman (1974) has advocated the inclusion of community-level variables in fertility research and advanced the hypothesis that 'the neighbourhood, community, or social milieu in which the couple live may affect their reproductive behaviour in interaction with the individual characteristics'. He argues that the significance of environmental influence should be taken into account in conceptualizing and analysing fertility behaviour. The environmental factors, though external to the individual, are considered to be potentially influential upon the members of the community and have relevance to behaviour settings.

The relevance of community-level characteristics on fertility has now become well recognized and, under the aegis of the WFS, fertility/family planning studies in many countries including Bangladesh have adapted and administered the community questionnaire prepared by Freedman. Drawing upon data from the Bangladesh Fertility Survey, the present analysis addresses itself to the following three major questions:

- 1 Is there any relation between the village factors and the family planning behaviour of the rural women?
- 2 What is the nature and magnitude of the relationship, if there is any?
- 3 What is the relative power of the socio-economic, demographic characteristics of the individual women and the village factors to explain the variation in contraceptive behaviour?

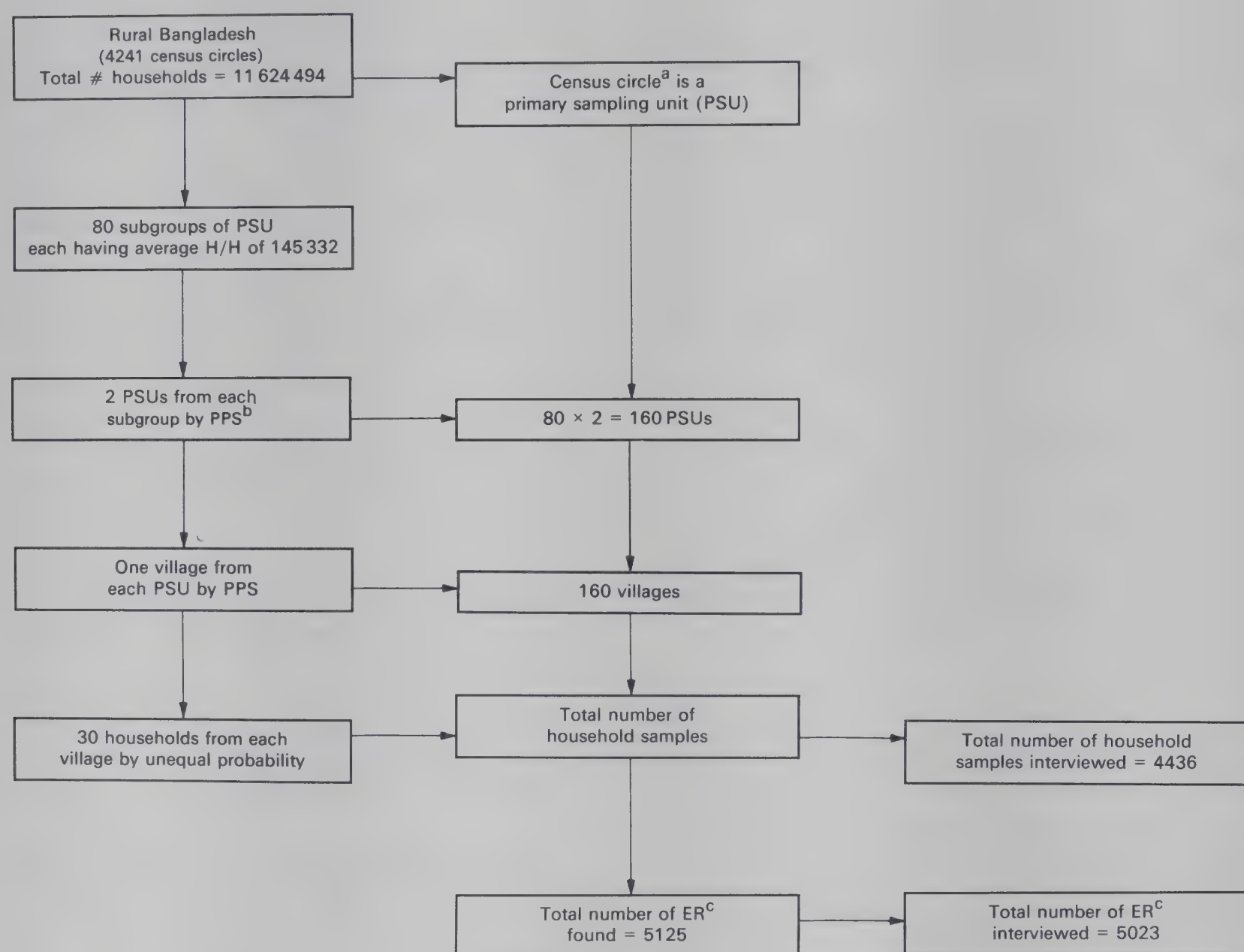
In Bangladesh, there has been no effort made so far to address such questions and demonstrate empirically the significance of village-level variables as predictors of individual behaviour, especially in relation to the significance of individual-level predictors. The purpose of this analysis is to discern whether village-level variables contribute anything, over and beyond the contribution of individual characteristics, to the explained variance; and, if they do, which are the important village variables and what is the nature of their relationship. In Bangladesh, as elsewhere, the interest

in the analysis of such issues is a recent one and has both theoretical and practical implications.

1.3 MATERIALS AND METHODS

The data for the analysis have been drawn from the Bangladesh Fertility Survey (BFS), a project of the World Fertility Survey and from the 1974 Bangladesh Population Census. As with all other WFS projects the BFS was a single-round, cross-sectional survey; it followed a multi-stage sampling design with probability of selection proportional to size, defined in terms of households.

For the purposes of the BFS, the whole of Bangladesh was divided into two strata – rural and urban. As this analysis uses data drawn only from the rural stratum, the discussion on the sampling design is restricted to it. (A full discussion on the sampling design can be found in Ministry of Health and Population Control (1978).) As is seen in figure 1.1, at the first stage, the rural stratum of 4241 census circles were divided into 80 subgroups; from each subgroup two census circles were selected. At the second stage, from each selected census circle, one census village was selected, based on probability proportionate to the number of households. Thereafter, the ultimate sampling unit of household was selected systematically by the application of an



^aCensus circle: on the average 15 villages are grouped into a union; one or more unions constitute a census circle.

^bPPS: probability proportionate to size defined in terms of number of households. A household is a group of persons usually living and eating together in the same structure of dwelling.

^cER: eligible respondents are ever-married women of childbearing age, under 50.

Figure 1.1 Sampling frame of BFS rural sample

interval calculated to yield 30 households from each selected census village. (The probability of selection of a household, by this procedure, is inversely proportional to the number of households in the village.) Although taking 30 households from each of the 160 villages should have yielded a total of 4800 households, the actual number of households sample was 4630, due to an overestimate of the number of households expected to be found in the sample villages. The response rate for the household sample was 95.8 per cent with 4436 household schedules being successfully returned. The number of eligible respondents, defined as ever-married women of childbearing age under 50, found in the sampled households was 5125 out of whom 5023 were successfully interviewed, yielding a response rate of 98 per cent.

Community data was collected for the 160 rural villages in the sample and obtained from the persons in the villages regarded as knowledgeable. Different aspects of the village were measured, such as socio-economic conditions, availability of and access to means of transportation and communication, school, health, sanitation, and family planning services, agricultural development facilities, and presence or absence of youth and farmers' organizations in the village. For the purposes of BFS, a village is operationally defined as having a physical boundary with a distinct name in use by the revenue, civil and census administration.

Dependent variable

The dependent variable analysed in this study is a dichotomy: ever-use of contraception, scored 1 for ever users and 0 for never users. An analysis of current contraception among the rural women would have been more appropriate. But the current level of contraceptive practice, 6 per cent, is too low to permit a multivariate analysis of differentials in contraceptive practice. Ever-practice of contraception – reported past and present contraceptive practice – , instead, provides the basis of this analysis. Even the level of ever-practice is not high; only 608 out of the 4962 ever-married women aged 10–49, that is 12.3 per cent, reported ever-practice of any method of contraception. Table 1.1 reports the percentages of women who had ever used different methods of contraception. An additional slight problem in analysing ever-use is that the dependent variable may be prior to some of the independent variables.

Pill, condom and rhythm seem relatively popular

Table 1.1 Percentages of women who have ever used methods of contraception (N = 4962)

Contraceptive methods	Per cent ever used
Pill	4.1
IUD	0.8
Female sterilization	0.1
Male sterilization	0.4
Other female scientific	0.4
Douche	1.6
Condom	4.4
Rhythm	4.4
Withdrawal	2.4
Abstention	2.1
Other methods	0.7

methods and are more frequently reported as having been used than any other methods. The next most frequently used methods, in order of their rankings, are withdrawal, abstinence, and douche. Female sterilization is the method for which reported ever use is lowest.

Methods were classified into two groups on the basis of cluster analysis. One group consists of the pill, IUD, male and female sterilization, and douche. This was labelled 'clinical', as all but douche are clinical methods. Condom, rhythm, withdrawal and abstinence fall into the second group. Three-fourths of the ever users have used these non-clinical contraceptive methods. According to the WFS classification of methods into efficient and inefficient, half of the acceptors come out as having used efficient methods (pill, IUD, sterilization and condom) and the other half inefficient methods (withdrawal, abstinence and rhythm).

Individual-level independent variables

All eligible women, defined as those ever married and aged between 10–49 years, found in the sampled households were the subjects of the individual-level survey. Twenty individual-level measures have been used in this analysis, constructed from the responses to the WFS core questionnaire adapted for the Bangladesh Fertility Survey. Included are the family demographic and socio-economic characteristics of the individuals, their husbands, and families they belong to:

Socio-economic

- | | | |
|----|---|--|
| 1 | Education of the women | 0 = No education
1 = some education (literate) |
| 2 | If ever worked | 0 = Never worked
1 = Ever worked |
| 3 | Husband's education | 0 = No education
1 = Primary passed
2 = Beyond primary |
| 4 | Husbands's most recent occupation | 1 = Non-agricultural occupation
2 = Cultivators, tilling own land
3 = Cultivators, share croppers
4 = Workers and labourers |
| 5 | Husband's work status | 1 = Paid worker
2 = Self-employed with no employees
3 = Self-employed with some employees |
| 6 | Number of times rice consumed yesterday | 0 = One or less
1 = Two times
2 = Three times |
| 7 | Number of days meat/fish eaten during the last 7 days | 0 = None
1 = 1 or 2 days
2 = 3 to 5 days
3 = All 7 days |
| 8 | Own house or not | 0 = Don't own house
1 = Own house |
| 9 | Number of cattle owned | 0 = None
1 = 1-3 cattle
2 = 4-140 cattle |
| 10 | Number of goats owned | 0 = None
1 = 1-60 goats |
| 11 | Modern objects owned or not | 0 = None
1 = At least one |
| 12 | Own agricultural land or not | 0 = Own no land
1 = Own land
2 = Non-agricultural occupation |
| 13 | If children work for money or not | 0 = Don't work
1 = Work (at least one aged 5 or more) |
| 14 | If children attend school or not | 0 = Don't attend
1 = Attend (at least one aged 5 or more) |

Demographic

- | | | |
|----|---|---|
| 15 | Age of the woman (in completed years) | |
| 16 | Duration of marriage | |
| 17 | Number of living children | |
| 18 | Desired versus actual number of children | 1 = Desire less than living
2 = Equal
3 = More than living
4 = Non-numeric responses |
| 19 | Knowledge of clinical contraceptive methods | 1 = Pill
2 = IUD
3 = Male sterilization
4 = Female sterilization
5 = Douche |
| 20 | Knowledge of non-clinical contraceptive methods | 1 = Condom
2 = Withdrawal
3 = Abstinence
4 = Rhythm |

The selection of the variables listed above is governed by their availability in the BFS, of course, and also by the expectation, based on previous studies and theoretical considerations, that they would capture several important aspects of the individual woman's demographic, socio-economic, and psychological characteristics that were thought to be associated with individual contraceptive behaviour.

Village-level independent variables

At the village level, there are 51 explanatory variables as follows:

- 1 Per cent of families owning tin-roofed houses
- 2 Per cent of families owning land
- 3 Per cent of total male population working
- 4 Per cent of total female population working
- 5 Per cent of total male population in agricultural labour force
- 6 Distance to nearest paved road
- 7 Distance to nearest bus station
- 8 Distance to nearest railway station
- 9 Distance to nearest steamer station
- 10 Distance to nearest launch station
- 11 Distance to Madrasa (Religious Educational Institute)
- 12 Distance to primary school
- 13 Distance to boys' high school
- 14 Distance to girls' high school
- 15 Distance to college
- 16 Per cent of total population literate
- 17 Per cent of total male population literate
- 18 Per cent of total female population literate
- 19 Years of schooling for women aged 10-49
- 20 Years of schooling for the husbands
- 21 Per cent of women aged 10-49 literate
- 22 Per cent of husbands literate
- 23 Average years of schooling for husband and wife
- 24 Number of tubewells available for drinking water
- 25 Number of sanitary latrines available
- 26 Distance to dispensary
- 27 Distance to pharmacy
- 28 Distance to health clinics
- 29 Distance to MCH clinic
- 30 Distance to FP clinics
- 31 Distance to qualified doctor
- 32 Distance to nurse
- 33 Distance to Thana Centre
- 34 Distance to Dai (traditional midwife)
- 35 Distance to Kabiraj (folk doctor)
- 36 Distance to other doctors
- 37 Number of times vaccination team visited the village during the last 12 months

- 38 Number of times family planning team visited the village during the last 12 months
- 39 Number of times malaria team visited the village during the last 12 months
- 40 If village has Thana Irrigation Project (TIP) or not
- 41 If village has co-operative society or not
- 42 Number of times agricultural worker visited the village during the last 12 months
- 43 If the village has deep tubewell for irrigation
- 44 If the village has shallow tubewell for irrigation
- 45 Per cent of families using chemical fertilizers
- 46 Per cent of families using new seed variety
- 47 Per cent of families using insecticides
- 48 Number of radio sets available in the village
- 49 Newspapers available or not
- 50 Presence or absence of youth club in the village
- 51 Proportion of families sending their children to school

The village measures were reduced to 18 variables through factor analysis. The variables are as follows:

- | | | |
|----|---|-----------------------|
| 1 | Employment in agriculture | High
Medium
Low |
| 2 | Economic condition | High
Medium
Low |
| 3 | Level of education | High
Low |
| 4 | Access to education institutions | High
Medium
Low |
| 5 | Proportion of families sending children to school | High
Medium
Low |
| 6 | Mean level of education desired for children | High
Low |
| 7 | Access to means of water transportation | High
Medium
Low |
| 8 | Access to means of road transportation | High
Medium
Low |
| 9 | Modern agricultural practices | High
Medium
Low |
| 10 | Irrigation facilities | Have
Don't Have |
| 11 | Farmers' organization | Have
Don't Have |
| 12 | Youth club | Have
Don't Have |

13	Number of radios available	0-10 11-70
14	Availability of newspapers	Available Not Available
15	Access to Thana-based health and family planning services	High Medium Low
16	Extent of health and family planning workers visit	High Medium Low
17	Access to local health and family services	High Low
18	Sanitation facilities	High Low

Analytic techniques used

In order to gain manageability of a mass of data, a number of analytical steps, as follows, were taken. First, 51 village-level measures were reduced to a smaller set of 18 explanatory variables through factor analysis (Harman 1960; Thurstone 1961). All of the village-level variables, except presence or absence of youth club and the number of radios available in the village, are indices constructed from the factor scores.

Secondly, using the multivariate analytic technique AID (Sonquist *et al* 1973) the best predictors were identified from among the combined set of individual and village variables.

Thirdly, the multivariate analysis technique of Multiple Classification Analysis (Andrews *et al* 1973) was applied to the best predictors identified by AID in order to understand their direction and magnitude of relationship, and to assess the relative contribution of the village and individual factors with regard to the explanation of Bangladesh rural women's contraceptive practice. MCA, it may be added, allows for the analysis of the effects of categorical variables on an interval-scaled dependent variable, based on the assumption that the effects of the independent variables on the dependent variable are additive. It is equivalent to multiple regression using dummy variables.

1.4 ANALYSES

Figure 1.2 presents the summary results of AID analysis of ever-use of contraception using both individual and village-level variables. In each box of the 'tree', N represents the number of respondents having the set of characteristics represented by the box, and Y is the mean of the dependent variable for those respondents. The per cent value which appears at each

'branching' or 'split' in the tree is the proportion of the total variance accounted for by that branching. A variable in the tree is split into further groups whenever the resulting split fulfils two criteria: (1) the 'Between sum of squares' produced by the split is at least 0.6 per cent of the 'Total sum of the squares' for the whole sample; (2) the N in each of the resulting groups is greater than or equal to 25. All of the predictors are treated as 'free' as opposed to monotonic; that is, rearrangement of categories was freely allowed to find the partition which maximized the sum of squares between the two resulting groups. Out of 38 variables, individual and village combined, only five variables, two village-level and three individual-level, turn out to be associated with ever-practice of contraception. The village-level variables are: family planning workers' visits to the villages and villagers' access to means of road transportation. The three other individual-level variables related to ever-practice of family planning are: knowledge of clinical contraceptive methods, knowledge of non-clinical contraceptive methods, and desired family size relative to living number of children at the survey.

The nature and extent of influence of these predictors on women's contraception are analysed through MCA and presented in table 1.2.

Controlling for the effects of individual-level variables, women whose villages are high in access to roadways or have been visited 'Many' times by family planning workers practise contraception slightly more than those women whose villages are low in access to a transportation system or whose villages have not been visited 'Many' times by family planning workers.

Contraceptive practice among the rural women increases with the rise in the number of living children. Women with fewer than three children practise less and those with three or more — or more definitively, five or more — children tend to practise more than the average.

Women's knowledge of both clinical and non-clinical contraceptive methods is positively associated with women's ever-practice of contraception, both before and after controlling other variables. Women who know at least one non-clinical method practise contraception most and the women who know no non-clinical method, least.

Individual women's knowledge, it may be noted, is strongly associated with village-level aggregate knowledge of both clinical and non-clinical methods. (Analysis not presented here; see Alauddin 1979.) When the important individual-level predictors are controlled, the aggregate knowledge of clinical contraceptive methods of the village makes a net contribution of 8 per cent and non-clinical contraceptive methods,

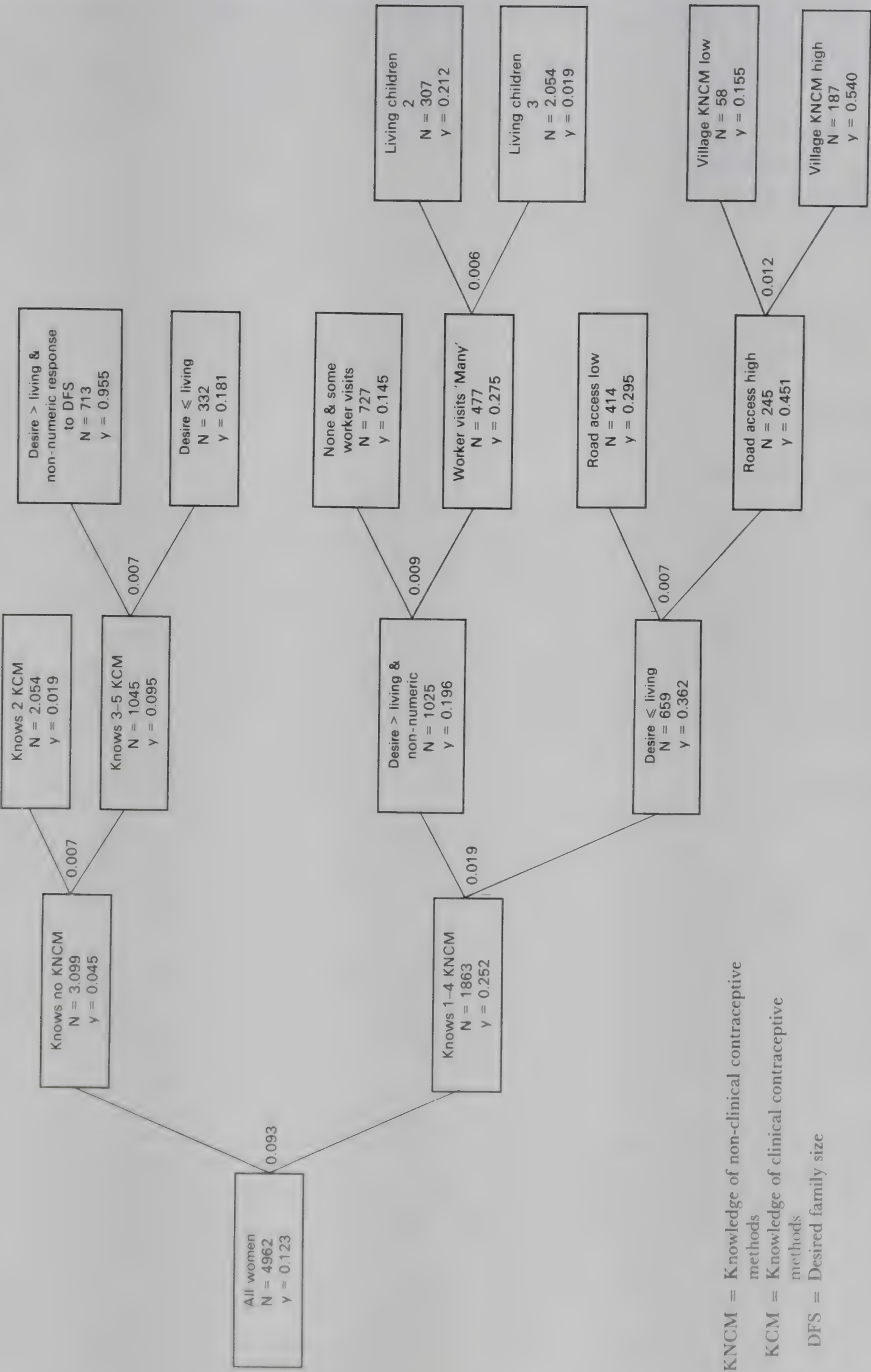


Figure 1.2 Summary of AID analysis of ever-use of contraception, using both village and individual variables: BSS/TSS = 16.1 per cent

Table 1.2 MCA of ever-practice of contraception using village and individual predictors

Grand mean = 0.122

Predictors	Class mean	Unadjusted coefficient	Adjusted coefficient	Adjusted mean	Number of cases
Knowledge of non-clinical contraceptive methods					
Knows no method	0.045	-0.078	-0.062	-0.061	3091
Knows 1-4 methods	0.252	0.129	0.103	0.225	1863
Desired versus actual number of children					
Desired less than actual	0.243	0.121	0.044	0.167	576
Equal	0.207	0.084	0.052	0.174	831
Desired more than actual	0.109	-0.104	0.004	0.126	1889
Non-numeric response	0.054	0.067	0.052	0.174	1280
Number of living children					
No children	0.032	-0.090	-0.055	0.067	865
1-2 children	0.100	-0.022	-0.016	-0.107	1526
3-4 children	0.143	0.021	0.005	0.127	1291
5 or more	0.189	0.067	0.052	0.174	1280
Knowledge of clinical contraceptive methods					
Knows no methods	0.027	-0.095	-0.035	0.088	1069
Knows 1-2 methods	0.078	-0.024	0.024	0.098	1560
Knows all 5 methods	0.197	0.074	0.033	0.155	2320
Extent of health and family planning worker visit					
Low	0.106	-0.016	-0.014	0.109	1533
Medium	0.088	-0.035	-0.029	0.094	1583
High	0.169	0.047	0.032	0.155	1568
Access to means of road transportation					
Low	0.092	-0.030	-0.018	0.104	1515
Medium	0.110	-0.013	-0.017	0.105	1605
High	0.163	-0.041	0.038	0.161	1623

7 per cent, respectively, to the explained variance in the women's knowledge of these types of contraceptive methods. It is particularly noteworthy that the contextual effect shows up in relation to the effect of education on knowledge. The non-educated in high-knowledge villages are more knowledgeable about methods than the educated, as well as the non-educated, in the low-knowledge villages.

Women who offered non-numeric responses (depends on God, for example) to the question of

desired family size are among the least likely to have ever used contraception. The others are those who know no non-clinical methods and those who have no children. Women whose desired family size is less than or equal to the actual number of living children tend to practise contraception more than those whose actual number of children is less than the desired size.

The relative strength of village and individual variables in predicting the contraceptive behaviour of the Bangladesh women is presented in table 1.3.

Table 1.3 Rank order of predictors by MCA beta value for ever-use of contraception, using individual and village predictors

Rank order		Eta (i)	Beta (j)	Significant test (i)
1	Knowledge of non-clinical contraceptive methods	0.31	0.24	255.5 ^a
2	Desired family size relative to parity	0.20	0.11	54.3 ^a
3	Number of living children	0.16	0.11	44.6 ^a
4	Knowledge of clinical contraceptive methods	0.22	0.09	84.5 ^a
5	Extent of family planning worker visit to the village	0.10	0.09	18.6 ^a
6	Access to means of road transportation	0.09	0.08	13.6 ^a

R^2 unadjusted = 0.150

R^2 adjusted = 0.147

^aSignificant at 0.001 level.

When considered one at a time, all of the predictors – both village and individual – are significantly related to couple contraceptive behaviour, and the relationships are all significant at the 0.001 level. In order of relative importance, knowledge of non-clinical contraceptive methods stands out as the most powerful predictor of contraceptive behaviour, both before and after the effects of other variables are controlled. The second most important correlate of ever-use of contraception is the desired family size relative to the parity of the women. It should be noted that knowledge of non-clinical contraceptive methods and knowledge of clinical contraceptive methods are correlated with each other; so are desired family size relative to parity and number of living children. The zero-order effects on non-clinical contraceptive methods and desired family size versus number of living children are not their ‘true’ effects because of their inter-correlations. The reduction of beta values from that of eta for these variables testifies to the presence of inter-correlations.

The two village-level factors, family planning workers’ visits to the villages and access to road transportation, associate significantly with ever-use of contraception, but their relative strengths are not great. The two variables together contribute only a little more than 1 per cent to the total proportion of variance explained, which is 15 per cent.

The manner in which the village-level factors are related to ever-use of contraception is very interesting. First of all, ever-use is most strongly related to knowledge of non-clinical contraceptive methods. Within this group, ever-use is even more frequent if the women desire fewer children than they already have and the villages in which they reside are accessible to means of road transportation. Ever-use is most frequent if these

villages are also high in the aggregate level of knowledge of non-clinical contraceptive methods. Still within this group, even if they desire more children than they have, ever-use rises substantially if the villages in which they reside had many visits from family planning workers and if they had less than three children to date. These results suggest that village access to roads and village exposure to family planning workers may facilitate use of contraception among the Bangladeshi rural women, given some motivation on their part.

1.5 CONCLUSION

From this analysis of the relevance of village-level factors to contraceptive practice, some important relationships emerge and can be summarized as follows:

- 1 Village-level knowledge has a strong positive association with individual knowledge of contraceptive methods (see Alauddin 1979).
- 2 Village access to the road transportation system and the extent of family planning workers’ visits to the village seem to provide appropriate conditions to encourage use of contraception.

Such relationships lend support to propositions which emphasize the importance of community or village factors in individual fertility behaviour. But the relative potency of village individual variables, as found in AID and MCA analyses, suggests that village-level factors are generally less useful as predictors of contraceptive behaviour than we had expected.

The failure to uncover strong village effects on individual contraception might have arisen because of theoretical problems, both statistical and sociological, and to limitations of the data used in the analysis.

The dependent variable, ever-use of contraception, is a dichotomy and skewed, but the multivariate model applied in this analysis assumes a continuous dependent variable and a normal distribution. We have applied normal distribution theory to a situation in which log normal distributions are appropriate. This has the following consequences:

- 1 the predicted values can fall outside of the 0, 1 range of probabilities;
- 2 the additivity of coefficients is suspect (a consequence of 1);
- 3 the standard errors are wrong, so that the efficiency of the tests are impaired;
- 4 causal inference is impaired.

Sociologically, we assumed direct effects only and made no attempt to review causal structure. Thus, the variables rejected may be very important indeed, but their effects causally prior to the assumed effects and therefore partialled away.

In retrospect, it was premature to collect data on many variables, for example, data on agriculture development (introduction of HYV and irrigation facilities), availability of tubewells for safe drinking water and sanitary latrines, electricity and women's co-operatives. These programmes had just started operating on a small scale at the time the BFS was mounted in 1975. In addition, other programmes, such as the basic need fulfilment programme of the Rural Social Service Projects of the Ministry of Social Welfare and the Swanirvar (self-reliant) movement, which are now demonstrating significant impact on contraception, had then just begun (see Alauddin *et al* 1981; Alauddin *et al* 1983). So had the participation of women in mothers' clubs and women's co-operatives. Because these programmes were at an early stage, many of the independent variables used in the analysis have skewed distributions, like our dependent variable.

The data used are cross-sectional rather than longitudinal, but the latter would have been more appropriate for assessing the influence of village-level development and family planning programmes on behaviour. While assessing the effects of development programmes, we made an implicit assumption that all of the development programmes had been in operation at least as long as the family planning programmes and that their effects were uniform across villages regardless of their 'age' factor. The age factor of family planning programmes had also not been taken into account. Future research should be based on well-designed analysis of longitudinal data, which would permit assessment of time-order relationships.

The third major limitation of the data is the measurement of village-level variables. Some of the

village variables, for example availability of irrigation facilities for agricultural development, are measured merely by their presence or absence in the village. The measurement did not include adequacy or inadequacy of a programme for the village, or how many villagers use the facility. We further assumed that all the villagers had equal access and were eligible across the board. Other studies find that agricultural development inputs, especially irrigation facilities, are enjoyed primarily by a select group of farmers who have large land holdings and are economically better off. The differential effect of development by socio-economic class is likely to be increasingly significant and we believe that it should be taken into account in any future studies.

Nevertheless, despite these limitations, this study demonstrated that village-level factors are useful, though much less strongly so than individual-level factors, in explaining fertility-related behaviour of Bangladesh rural women. Village-level factors produce the necessary conditions to promote contraceptive use. Further studies in this area are required to assist in the formulation of both theory and future programmes.

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2 Community Effects on Contraceptive Use in the Philippines

Luisa T. Engracia

2.1 INTRODUCTION

Participators in the social world are predisposed to behave or react in a specific way according to their own personal attributes. Yet it can hardly be denied that individual behaviour is also conditioned by the institutional setting in which a decision to act in a particular manner is made. Thus we find persistent urban-rural differentials in fertility even after controlling for the relevant individual characteristics of reproductive couples. This is essentially so because, as Freedman (1974) has put it, the 'social milieu in which couples live may affect their reproductive behaviour in interaction with the individual characteristics usually considered'. Recognition of such institutional impingements on micro-level decisions and actions gives rise to the need to examine the influence on individual behaviour of characteristics of social groups and the social setting.

In recent years there has been considerable discussion of the relationships between macro-level variables and individual behaviour. The literature is replete not so much with empirical findings on these relationships as with the issues surrounding the investigation of these types of relationships. The issues include the relevance of the approach itself, which is to infer individual behaviour or characteristic from macro-level phenomena, the measurement of the associated multi-level variables, and the statistical methodologies for relating macro- and micro-level characteristics.

The main concern here is to present empirical results of recent attempts to analyse the impact of community-level variables on the current use of an efficient method of contraception among 'exposed' married women in the Philippines. A model is proposed which incorporates effects of individual characteristics of women or mothers and variables representing the characteristics of their communities of residence on contraceptive use. The community-level variables are integrated into the model by assigning to each unit of observation — in this case a woman respondent — scores representing such variables.

Data from the Republic of the Philippines Fertility Survey 1978 (RPFS) are used for this purpose. Apart from collecting individual-level data about the respondents, including birth and marital histories, knowledge and practice of birth limitation and other socio-demographic information, the survey gathered information on the environmental context of the micro-level data through a community-level questionnaire. Administered only in the rural areas, the community questionnaire collected information about the presence or absence in the community or the proximity of the community to certain types of facilities, such as those for transportation and modern communication, health, education, government agencies, etc. The survey instrument that was used in collecting these data is reproduced and shown in appendix A.

The community, as used in the RPFS, refers to that network of social inter-relationships among residents occupying a more or less defined geographical area known as the 'barangay'. The barangay is the smallest political subdivision of the country's territories. Both in terms of area and population, the barangays are very heterogeneous. While some barangays include as few as 100 residents, others are actually conglomerations of up to as many as 20 000 persons. In area, the barangays range from a few hectares to more than 20 square kilometres. Residential patterns within the barangays are likewise so diverse that the term 'community' has become an ambiguous concept and assessment of so-called community effects problematic. Even a delimitation of the analysis to rural barangays, as the present study has done, does not quite settle the question of what constitutes a community, since even among rural barangays wide diversity in area, population and settlement patterns exists. In instances where a barangay is moderately sized and features a single identifiable cluster of its population, the sphere of community influence may be well defined. However, in larger barangays where the members are scattered or grouped in several clusters, equating a barangay with a community may no longer be valid.

Any interpretation of the results, then, should be

done with caution and in the light of these limitations. Needless to say, there are also other problems that can be expected to bear on the results; these will be discussed as we proceed.

The analysis is based on a sample of 352 rural barangays containing 4623 interviewed ever-married women. The respondent for the individual-level questionnaire was, of course, the woman herself, while for the community-level questionnaire the respondent was, in most cases, the barangay captain — probably the best informed person in the barangay.

2.2 COMMUNITY EFFECTS ON CONTRACEPTIVE USE

Theoretical considerations

In general, the analysis of levels, trends and differentials of contraceptive use has taken the micro-approach, relating personal characteristics of individuals or couples to their contraceptive behaviour. This approach has dominated the literature more for reasons of data constraints rather than due to theoretical considerations. Data collection on contraceptive use has been done mostly through the so-called KAP (Knowledge, Attitude and Practice) of family planning surveys which are characteristically designed to collect individual-level characteristics and are thus geared for micro-level analysis. Service statistics of family planning programmes likewise relate only to the personal characteristics of family planning clients and rarely, if ever, are these linked with societal-level conditions.

Although analysis of contraceptive use has been somewhat limited in this respect, concern has nevertheless been expressed about the need to consider macro-level variables, particularly in view of the concern about the role of overall socio-economic development *vis-à-vis* that of organized family planning programmes on contraceptive prevalence levels. At least two arguments are given for why socio-economic development affects levels of use. One is that the practice of birth limitation is a form of response to changing social and economic conditions (Davis 1963; Carlsson 1966). The argument is that as society becomes more and more complex, traditional familial roles start to break down and childbearing gets lower priority as a societal function. Couples, particularly women, seek other alternatives in life's pursuit — alternatives that are often viewed as antithetical to family life. Pursuit of these alternatives therefore calls for efforts to limit family size and, hence, for the practice of contraception.

Proponents of this view maintain that contraceptive

prevalence is a natural consequence of development and modernization that will ensue anyhow regardless of explicit efforts to popularize birth control methods. A corollary of this view is the hypothesis that the level of contraceptive use will differ across the various socio-economic groups of the society, varying positively with social class as well as with exposure to modernizing forces.

Another view credits socio-economic development with the technological innovations leading to increased awareness of the methods of birth limitation, increased production of contraceptive supplies, and wider and more efficient distribution of such supplies (Bogue 1969).

The remarkable success of the family planning programmes, for example those of South Korea and Taiwan, leaves no doubt about the influence of such efforts on the levels of contraceptive use. Family planning programmes hasten the diffusion of knowledge and use of contraception; they are responsible for wider distribution of the supplies for birth limitation than perhaps might otherwise be possible. But, of course, in the final analysis the intention of programme activities is to bring about successful fertility regulation. The existence of a programme as such does not necessarily ensure an increased level of contraceptive use.

These considerations clearly indicate that the analysis of contraceptive use must include not only individual psychological variables but also societal-level factors. Individual-level variables account for only a portion of the total variation in contraceptive behaviour and only in so far as decisions to regulate fertility are influenced by particular individual characteristics, such as age of women, their preference for or attitude toward children and their social and economic characteristics. Decisions to actually use contraception, however, are shaped largely by societal context. If opportunities for upward social mobility are available in the community and are perceived as such by couples, if prevailing social norms concerning the practice of birth control are favourable, and if the methods and supplies are readily accessible in the community, then couples wanting to limit their families are likely to decide in favour of adopting contraception.

The setting

The Philippines is a country of approximately 50 million people growing annually at a rate of about 2.5 per cent — a rate that is considered moderately high by contemporary world standards. Its people basically belong to the Malay race, although its culture is a blend of western and oriental. The Western influence, particularly in social, religious and political

affairs, came from years of domination by Spain and later, by the United States. On the other hand, its geographic proximity to great Asian cultures, like China and Indonesia, has given its social and cultural life a predominantly Asian colour.

Presently, the country has a developing economy. During the last few decades, major social and economic transformations have taken place both in the cities and in the countryside. Close to two-thirds of the population still reside in areas classified as rural. Substantial urban-rural differentials in the social, demographic, and economic characteristics of the population still persist although the intensified infrastructure and other rural development programmes of the government seem to have narrowed these gaps during the last decade or so.

Despite the predominantly Catholic religion, the government has opted for a policy of population control through a family planning programme that promotes artificial means of fertility regulation. The programme was officially instituted in early 1970 and, to date, it still continues to operate with full govern-

ment support, although the focus and strategies have been revised over the years.

Without necessarily attributing to the family planning programme any credit for success, this author wishes to point out that during the years following the official establishment of the programme, there was a marked increase in contraceptive use among Filipino women. According to the 1978 RPFS data, close to 60 per cent of ever-married women in childbearing ages claimed to have ever used a method of birth control; the corresponding figure in 1972 was only 31.6 per cent. Among women who were exposed to childbearing, the proportion of those who were using a method at the time of the 1978 survey was likewise higher than it was in 1972 — again an indication of increased prevalence of birth control practice.

As expected, strong differentials in contraceptive behaviour were observed not only in terms of individual socio-economic characteristics of women but in terms of type of place of residence as well, as indicated in table 2.1 and figure 2.1 By categories of education, the proportion of ever users and current users of

Table 2.1 Percentage of ever-married women who have ever used contraception and percentage of 'exposed women' who are currently using a method of contraception, by selected socio-economic characteristics: 1978 RPFS

Socio-economic characteristic	Ever users		Current users	
	Per cent	N	Per cent	N
Education of woman				
No schooling	17.0	537	16.0	299
Primary	42.0	2254	34.2	1512
Intermediate	59.2	3396	46.6	2451
High school	71.5	1927	58.4	1456
Some college	76.3	446	65.4	336
College with degree	79.1	707	68.1	539
Husband's occupation				
Professional, clerical and sales	72.5	1549	62.0	1180
Agricultural	45.9	4619	37.0	3251
Service and manual	67.4	3098	55.6	2252
Type of place of residence				
Urban	70.9	2976	59.7	2247
Rural	51.1	6292	41.6	4437
Region of residence				
Metro Manila	74.4	1166	61.7	905
Luzon	57.1	3953	46.4	2796
Visayas	49.2	2211	40.3	1544
Mindanao	57.5	1938	49.2	1440

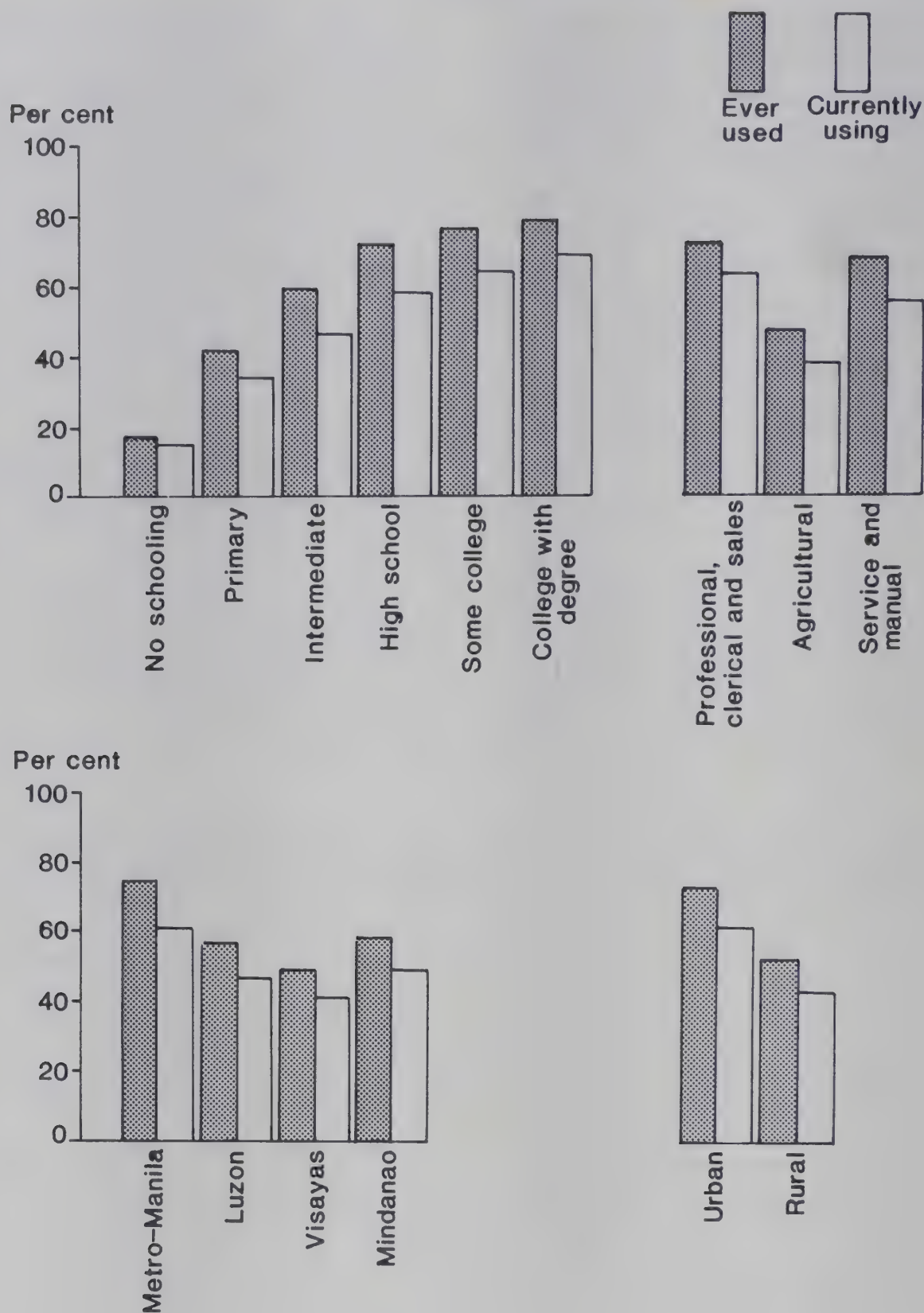


Figure 2.1 Per cent ever used and per cent currently using a method of contraception.

contraception monotonically increased as educational attainment of women increased; those with college degrees were at least four times more likely to have used a method of family planning. Likewise, those whose husbands were professionals, clericals or sales workers displayed a greater tendency to adopt contraception.

The proposition that contextual variables are related to contraceptive behaviour finds some support in a comparison of proportions of ever users and current users by type of place of residence and by

region of residence. Significantly higher prevalence can be observed in urban areas and in Metro Manila — areas which, in terms of modernization and development, are well ahead of the rest of the country. It is in these places where information about fertility control first spread and where facilities for contraception are accessible at relatively lower cost.

To sum up, the Philippines provide an ideal ground for testing community effects on contraceptive behaviour. As social and economic development is underway, there are structural differentiations among com-

munities, particularly in those aspects that have an effect on the formation of social norms regarding fertility and fertility regulation, on the diffusion of contraceptive knowledge, and on the availability of facilities for birth control. Family planning has been organized in the country, although the available resources for this activity are not uniformly distributed to all parts of the country, thus creating differential access to family planning services. As demonstrated earlier, contraceptive prevalence varies both by individual and societal-level characteristics. While association with the latter may possibly reflect only compositional differences, it is nevertheless hypothesized in this paper that there are independent effects of the community's structure on contraceptive behaviour.

2.3 DATA AND METHODS

As mentioned in the introductory section, the dataset to be used in this test of community effects on contraceptive use is the rural portion of 1978 RPFS. Of the 718 sample barangays covered by the RPFS, 359 were classified as rural. Seven of these rural barangays did not have responses to the community-level questionnaire, thus leaving a total of 352 rural barangays for which community information is available. It might be mentioned that the sampling scheme of the RPFS called for an interview of about 20 randomly selected households, and all ever-married women aged 15–49 therein, per sample barangay. After excluding cases of non-response, this scheme yielded a total of 4623 sample respondents in the 352 rural barangays. For the present study, the sample was further narrowed down to include only currently married 'exposed' women. Hence the final sample included a total of 3273 women.

The dependent variable, current use of an efficient contraceptive method, classifies the sample into two groups: current users and non-users. Note that the second category actually includes those who are currently using contraception but using only inefficient methods — like rhythm, withdrawal, abstinence and other traditional methods — and those who use no method at all. The decision to differentiate between efficient and inefficient methods was made to enable a more discriminating assessment of the organized family planning programmes. It is well known that even before the establishment of family planning programmes, reproductive couples already followed some forms of birth control. Use of such traditional methods does not require organizational ground work nor institutional interventions. Certainly, stimulating use of these

means of controlling births is not a principal objective of modern family planning programmes. Therefore, to make the analysis more attuned to the goal of this study, it was felt that the use of an *efficient* method (rather than of *any* method) of contraception was a more appropriate response variable.

For the assessment of community effects on contraceptive behaviour, this study makes use of two broad types of community-level variables, the degree of socio-economic development of the community and the accessibility of family planning services. The community questionnaire of the RPFS collected a host of information about the barangays (see appendix A), so the problem is deciding which of these items or sets of items may best characterize the communities in ways that will be meaningful for the problem at hand. Combination of these numerous variables into a few meaningful variables would be ideal; the question is how this can best be achieved.

Measurement of community development

The technique of factor analysis has been used quite satisfactorily in a number of applications to deal with problems similar to that which have just been described. In the present paper, however, a simple approach was followed to construct an index of community development based on the presence or proximity of a community to particular types of facilities. The types of facilities considered are the following: (1) telephone, (2) telegraph, (3) mail delivery, (4) newspaper outlet, (5) a movie house, (6) a secondary school and (7) electricity. The first five of these facilities are actually facilities for communication and they have been included as they provide 'measures of access to other centres and networks of interaction and influence' (Freedman 1974). A community with facilities for modern communication systems may be considered more developed than others, affording its constituents exposure to new ideas and interests. The presence of or proximity to a secondary school likewise indicates some degree of economic development for a community. Establishment of such schools in the Philippines hinges, first of all, on the ability of a town to support such an institution. A town must therefore be at least financially well off to be able to put up a secondary school. Secondly, these are established, if not in town centres, in localities where transportation facilities are at least adequate, or in other words, communities which are also centres of other forms of social interactions. Finally, in the Philippine context, the presence of electric power has almost always been equated with

modernization. Indeed, life-styles, patterns of consumption, types of industries, etc, contain an aura of modernity when electric power is available in the community.

Taking these factors into consideration, an index is developed to indicate the degree of socio-economic development of a community. A community is classified as low, medium or high on development in the following manner:

- Low – if there is no electricity and fewer than three of the other facilities are present in the community
- Medium – if there is no electricity and at least three of the other facilities are present; or, if there is electricity and fewer than three of the other facilities are available
- High – if there is electricity and at least three of the other facilities are present.

While the choice of the variables and the manner they are combined to produce the index have been, admittedly, arbitrary, it is felt that the index is adequate for the present purpose. It might be mentioned

that several other indices of development have been considered, and the one just presented appears to be the most satisfactory.

After having classified the rural communities in the above manner, each sample respondent was given a score corresponding to the level of development of her community of residence. If only to provide an indication of the validity of the index just constructed, cross-tabulations were made of the type of community and socio-economic characteristics of the women (shown in table 2.2 and table 2.3). Based on the assumption that individual characteristics take after the overall characteristic of the community, it is expected that the more developed a community is, the higher the socio-economic characteristics of the population will be. This expectation is borne out by the data. In table 2.2, for example, there is clearly a positive association between the constructed index of community development and educational attainment of women; those communities classified as highly developed have a higher proportion of highly educated women whereas those with a low level of development contained the highest proportion of women with no more than elementary education. On the other hand, if we take agriculture to be synonymous with low levels

Table 2.2 Distribution of rural sample respondents of the RPFS by level of community development and by educational attainment

Wife's education	High	Medium	Low
No schooling	6 (2.6)	54 (4.5)	280 (8.8)
Elementary	114 (48.5)	780 (64.8)	2366 (74.3)
High school	73 (31.1)	238 (19.8)	411 (12.9)
College	42 (17.9)	131 (10.9)	128 (4.0)
Total	235	1203	3185

NOTE: Figures in parentheses are proportions of cases falling in the stated category.

Table 2.3 Distribution of rural sample respondents of the RPFS by level of community development and by primary occupation of husband

Husband's occupation	High	Medium	Low
Professionals/clerical workers	64 (27.2)	150 (12.5)	181 (5.7)
Agricultural workers	52 (22.1)	552 (45.9)	2500 (78.5)
Service	22 (9.4)	93 (7.7)	61 (1.9)
Manual workers	97 (41.3)	407 (33.9)	443 (13.9)
Total	235	1202	3185

NOTE: Figures in parentheses are proportions of cases falling in the stated category.

of development, again we find a convincing consistency between the constructed index of community development and occupation of the respondent's husband. More than three-quarters (78 per cent) of the women residing in communities classified as 'low' have husbands who are engaged in agriculture as against 46 and 22 per cent, respectively, of those who live in areas classified as 'medium' and 'high' in development. Finally, it may be of interest to note here that the chi-squared statistics computed from tables 2.2 and 2.3 turned out to be very significant.

Measurement of accessibility to family planning services

We now turn to the other community-level variable — accessibility of family planning clinics. The RPFS community-level questionnaire ascertained the proximity of the following family planning facilities: (1) a family planning clinic; (2) a private doctor providing family planning services; (3) a full-time outreach worker (FTOW) or barangay supply point officer (BSPO); and (4) a pharmacy selling contraceptives. While the presence of a private doctor or a pharmacy may affect levels of contraceptive use in a community, these were not considered in the present analysis. The focus being on an organized family planning programme and its impact on contraceptive prevalence, this study determined accessibility of contraceptive supplies and services only on the basis of proximity of a family planning clinic. The presence of such a clinic in a community represents explicit programme efforts to provide family planning services, and therefore is an appropriate basis for an assessment of institutional influences on contraceptive behaviour. It might be mentioned that the FTOW or BSPO, while part of the organized family planning programme, have been likewise excluded since most barangays (about 85 per cent of the sample barangays) had either one of them. There is no variability therefore among women in so far as exposure to this type of facility or service is concerned.

As with community development, an index of accessibility to family planning clinics of communities was constructed and a corresponding score assigned to each respondent. The index categorizes the communities as being 'within', 'near', or 'far' in the following manner:

- Within** — if a family planning clinic is present in the community
- Near** — if a family planning clinic is outside the community but within a distance of 3 kilometres

- Far** — if the nearest family planning clinic is at least 3 kilometres away from the community.

Other variables

Empirically, contraceptive practice has been observed to be associated with demographic characteristics of women and with fertility preferences as well as socio-economic characteristics. It is, therefore, important that any analysis of variations in contraceptive behaviour should include an examination of the role of these individual-level characteristics.

In this paper, we consider age, as contraceptive use is usually a function of age. The typical age pattern of contraceptive use is an inverted U-shape curve — low at the young ages and at ages approaching the end of childbearing, high at the middle of the reproductive period. The low prevalence at the older ages has often been explained in terms of older women's tendency to stick to traditions, both in attitude and behaviour, particularly those who favour large family size. Another explanation is that older women feel they are less fecund and thus consider efforts to control birth as unnecessary. On the other hand, younger women, being in the process of building up their families, find no immediate reason for adopting contraception unless, of course, they desire to space their births.

To capture this curvilinear relationship between age and contraceptive use, the present study groups the respondents into three age categories: less than 30, 30–39 and 40 or over.

Whether additional children are desired is certainly a major determinant of the practice of contraception. Women who do not wish to bear any more children are more likely than others to be users of contraception. Data from 20 countries who have participated in the World Fertility Survey have shown this to be true to a very large extent. In those countries where levels of use were generally low, the percentage of users among those who did not want more children was at least twice as high as among those who wanted more (United Nations 1981). In this study, this variable is a dichotomy, taking the values 'want more children' and 'does not want more or undecided'.

The model

We now turn to the description of the analytical procedure for analysing contraceptive use. The analysis is carried out in a multivariate framework with four explanatory variables, two of which are community characteristics (level of community development and accessibility to family planning services) and

the other two individual characteristics (current age of women and desire for more children). While it is recognized that socio-economic characteristics, such as education of the woman, her work status, her husband's occupation, etc, influence contraceptive use as well, they are excluded from the model, in as much as they are highly correlated with the level of community development (as was shown earlier) and might therefore create problems of multi-collinearity.

As all the explanatory variables are categorical and the response variable is a dichotomy, estimation of logit-linear models is an appropriate analytic approach. A multi-way cross-classification of all variables is made, and for each combination of the different levels of the explanatory variables the logit of p is defined as the natural logarithm of the ratio $p/(1 - p)$, where p is the proportion of women currently using an efficient method of contraception. The logit, or the log-odds function of p , becomes the dependent variable in the model to be tested, which has the form:

$$\begin{aligned} \text{logit}(p_{ijkl}) &= \log \frac{p_{ijkl}}{1 - p_{ijkl}} = \mu + \alpha_{i(A)} + \beta_{j(B)} \\ &+ \gamma_{k(C)} + \delta_{l(D)} \end{aligned} \tag{1}$$

This model implies that the logit (p_{ijkl}) is a linear additive function of the mean effects of the i^{th} level of factor A, j^{th} level of factor B, k^{th} level of factor C and l^{th} level of factor D and an over-all mean effect, μ . If an interaction effect is hypothesized, then another component is brought into equation (1), such as $\psi_{ij(AB)}$, to represent the component due to the interaction of factors A and B. The parameters of this model are estimated by the maximum likelihood method using the computer package General Linear Interactive Modelling (GLIM), which uses an iterative algorithm.

The first step in the analysis involves model fitting, that is, determining which model best describes the data. We search for that linear combination of the independent variables – age, desire for more children, level of community development and accessibility to family planning services – which yields the least deviation from the observed logarithms of the odds of being a contraceptive user. A measure known as the deviance provides an indication of the fit of a model. The statistical significance of the deviance is determined by a chi-squared test. A deviance that is smaller than the theoretical chi-squared value at a given level of statistical significance and degrees of freedom suggests good fit. Among several good fitting models for a given set of observations, the choice of the best model falls on that one which is most parsimonious, that is,

one which has a non-significant deviance and one for which no other more complex model (in terms of having more parameters to be estimated) has a significantly smaller deviance.

The interpretation of the estimates of the parameters of the best fitting model follows next. The estimated parameters in a logit-linear model actually represent differences in logit means. The parameter for a main effect represents the difference between the logit mean of the cell corresponding to a given level of an independent variable and the logit mean of the cell corresponding to the reference category.

2.4 FINDINGS

Table 2.4 shows the deviances and corresponding degrees of freedom of several logit linear models fitted to the dataset.

None of the four independent variables alone

Table 2.4 Fit of various logit linear models of current use of effective contraception

Model	Deviance	df
1 (\emptyset)	256.1	53
2 (A)	243.7	51
3 (B)	156.1	52
4 (C)	195.0	51
5 (D)	190.8	51
6 (A)(B)	131.9	50
7 (A)(C)	183.5	49
8 (A)(D)	177.8	49
9 (B)(C)	103.0	50
10 (B)(D)	97.2	50
11 (C)(D)	154.0	49
12 (A)(B)(C)	79.1	48
13 (A)(B)(D)	71.5	48
14 (A)(C)(D)	142.0	47
15 (B)(C)(D)	65.4	48
16 (A)(B)(C)(D)	40.6	46
17 (AB)(C)(D)	38.3	44
18 (AC)(B)(D)	38.1	42
19 (AD)(B)(C)	39.9	42
20 (BC)(A)(D)	37.5	44
21 (BD)(A)(C)	39.5	44
22 (CD)(A)(B)	35.2	42

Notation: A – Current age
B – Desire for more children
C – Accessibility to family planning
D – Level of community development.

explain satisfactorily the variation in current use of efficient contraception (models 2 to 5). Even the desire for more children is not a sufficient determinant of contraceptive practice; there is a large variation in the odds of contraception among women who do not differ in terms of wanting or not wanting more children. Obviously, there are further considerations influencing the decision about whether to use contraception. Of course, this simply underscores the fact that, just like other forms of human behaviour, contraception is an individual's manifest response not to just one stimulus but to a multiple of forces acting simultaneously.

The additive models involving two (models 6 to 11) or three (models 12 to 15) of the independent variables also do not satisfactorily describe the data. Of the 3-variable additive models, only model 15 comes closest to being able to fit the data, although with a deviance of 65 at 48 degrees of freedom it is barely statistically significant at the 0.05 level. This model assumes additive effects of desire for more children, community development and accessibility to family planning. Except for model 15, all other 3-factor additive models do not provide a good fit to the data. Even with interaction effects included (not shown in the table), the models that consider only 3 of the 4 factors fall short in describing the data set adequately.

It is interesting to note that adding the variable on age to model 15, as is done in model 16, produces a fit to the data. The total deviance is reduced by about 15 (65.4–40.6). With only 2 degrees of freedom lost, we can say that age contributes significantly to the explanation of variation in current contraceptive use apart from that already explained by her desire for more children and by aspects of her community of residence.

Models 17 to 22 are all alternative descriptions (as all others that contain more terms than model 16) of the phenomenon being considered, as their deviances all turn out to be statistically non-significant. These models contain the additive effects of the 4 factors and an interaction effect of a pair of them. However, if we compare these models with the purely additive model (ie model 16) none of them turn out to be statistically different from the latter. In other words, none of the two-way interactions are significant in accounting for variations in the log of the odds-ratios of contraceptive use. Thus we regard the model (A) (B) (C) (D) (model 16) as the best fitting model.

We now turn to the implications of this model. Table 2.5 shows the parameter estimates of the model (A) (B) (C) (D) and their corresponding standard errors. All but one of these parameters turns out to be statistically significant.

Note that the 'grand mean' parameter represents

Table 2.5 Parameter estimates and their standard errors of the 4-factor additive model of current contraceptive use

Parameter	Estimate	Standard error
Grand Mean	– 1.971*	0.1372
Desire for more children		
Want more	–	–
Want no more	1.075	0.111
Current age		
< 30	–	–
30–39	– 0.129	0.1128
40 +	– 0.665*	0.1438
Level of community development		
Low	–	–
Medium	0.495*	0.1106
High	0.813*	0.1473
Accessibility to family planning		
Within	–	–
Near	– 0.270*	0.1268
Far	– 0.658*	0.1206

NOTE: The estimates marked * are at least twice their standard error.

the mean of the logit of p for the group of women having the first level category of the independent variables, that is, women who want more children, aged less than 30, and residing in communities that are least developed but have a family planning clinic. The grand mean value implies that the odds of this group of women currently using an effective method of contraception is only about 14 per cent ($e^{-1.971}$). The other parameters indicate the effects of the indicated level of the explanatory variables as a deviation from the grand mean of the logit of p .

Desire for more children

As expected there is a substantial effect on contraceptive use caused by a woman's desire to have more children. The odds ratio is almost three times greater ($e^{1.075} = 2.9$) for women who do not wish to bear more children than for those who still plan to have another

birth. Although women may use contraception for spacing births as well as stopping childbearing altogether, it is possible that those who use it for this reason are using inefficient methods.

Among those who want no more children, the odds that a particular woman is using contraception is 0.41 ($e^{1.075-1.971}$). This implies that even among the most motivated of Filipino women, the mean level of contraceptive use is still low: a majority of them still are not using any of the efficient methods of contraception. There are several possible explanations for this. Taboos on the use of artificial means of preventing pregnancies may be a major obstacle to the widespread use of these methods. The Catholic religion, which is the predominant faith in the country, strongly opposes the use of other than natural birth control methods and this may have a far-reaching influence, particularly on rural folk. Fear of side effects and inconveniences in the use of such methods as the pill, IUD, and sterilization, has also often been cited as a reason for the unfavourable attitude towards the use of these methods. A negative experience by one user can easily spread to other women through the informal communication system. Unless counteracted by proper education and authoritative information about the positive aspects of these modern methods of contraception, the negative attitude toward them may prevail and thus prohibit their popularity. The extent to which social institutions provide for the access of the means of efficient contraception is also a decisive factor in actual contraceptive behaviour. Notwithstanding a strong desire to prevent pregnancy, if the means are not readily available, women will opt for the traditional non-clinical methods or will not use any method at all.

Age of women

Age is related to contraceptive behaviour. However, the evidence from rural Philippines suggests differentials in current contraceptive use only between those above 40 years of age and their younger counterparts. Contrary to most findings, women who are at the peak of the childbearing period do not have the highest levels of contraceptive use. The parameter estimate corresponding to age group 30–39 is, in fact, negative although not significant. This finding, however, should be regarded only as tentative: the coding of age might explain the non-significant negative coefficient. A different age categorization might show a different age pattern.

The coefficient for the age category 40+ is negative (-0.665) and implies substantially lower odds of being a current user of contraception. Among this group of 'exposed' women, the odds are reduced by about

51 per cent from the level of use among women less than 30 years of age. This direction of the result is, of course, as expected. As one approaches the end of the childbearing period, one tends to believe that the chances of getting pregnant are already reduced. The prevention of pregnancy, such as through the use of efficient contraceptive methods, is, hence, less likely to be pursued. Besides, older women, especially those residing in the rural areas, are least likely to be informed about the possibilities of and the means for birth control. This could also partly account for their observed low level of use.

Level of community development

The hypothesis that community characteristics have important influences on the chances that a woman will use contraception finds a strong support from the data-set available. An examination of the models shown in table 4 already points to the plausibility of this hypothesis. Thus if we compare the models (A)(B) and (A)(B)(D), we find a substantial reduction in the total deviances, implying that even after controlling for age and desire for more children (both individual-level characteristics), the type of community of residence still accounts for large differences in levels of use.

The signs and magnitude of the coefficients, which happen to be highly significant, clearly indicate a gradient from low to high contraceptive prevalence as levels of community development improve. The odds of being a current user of contraception are 1.6 and 2.3 times greater in the 'medium' and 'high' communities, respectively, compared with the 'low' communities.

The effects of the level of community development on contraceptive use can be direct or indirect. The direct effects include the extent to which facilities associated with development contribute to the spread of information about the means for fertility control as well as the distribution of supplies and services for this purpose. The indirect effects, on the other hand, operate through the change in values that pertain to childbearing. Highly developed communities have usually more complex social structures characterized by the blurring of traditional sex-oriented role differentiation and division of labour. Here we expect more and more women taking roles that traditionally were for men. This takes them away from the stereotyped housewife and mother roles which normally assign childbearing and child rearing as their main functions in society. As society becomes developed and modernized, aspirations for upward mobility are likewise enhanced, with the same negative effect on the attitude towards childbearing.

The effects of the variable on desire for more

children may reflect in part the indirect influence of community development for, as we have argued, child preference is also influenced to a certain extent by aspects of the community. Even after we have controlled for the effect of desire for more children, there still persists a substantial effect caused by level of community development.

Accessibility to family planning

The analysis indicates that current use of efficient methods of contraception among 'exposed' women is affected by the degree to which family planning clinics are accessible. The results indicate that the farther away a clinic which is part of the organized family planning programme is from the woman's place of residence, the less likely she is to be currently using. The highest prevalence of contraceptive use is among women who reside in communities where family planning clinics have been established. A relatively less accessible clinic, that is, one which is outside an individual's community of residence but less than 3 kilometres away, has the effect of slightly reducing the chances that the woman is contracepting – the coefficient for the 'near' community is -0.270 and barely significant. The largest differential is between the 'within' and the 'far' communities: the odds of use are about 52 per cent lower for women in the latter.

2.5 SUMMARY

In a multivariate analysis, we test whether or not community characteristics are associated with levels of contraceptive use among rural women in the Philippines, using data obtained from the 1978 RPFS. The response variable for each 'exposed' woman in the sample is whether or not she is currently using an efficient contraceptive method. Logit-linear modelling is then applied to test hypotheses about the effects of selected factors, representing both individual and community characteristics. Two individual-level characteristics were considered, namely, current age of the woman and her desire for more children. The degree of socio-economic development of the community and the proximity of a family planning clinic were the aspects of the community examined.

Results of the analysis indicated that the age of a woman, her desire for additional children, the level of development of her community of residence and its accessibility to a family planning clinic all had a significant effect on the odds of her being a current user of efficient contraception. Of these four variables, current contraceptive practice was most strongly influenced by

whether or not a mother wants to have another child. Mothers who did not wish to bear more children were three times more likely to be using efficient birth control methods.

This study does indicate that there are strong associations between features of the community and individual contraceptive behaviour. After controlling for the effects of the individual-level characteristics, the community effects remained prominent. Of the two types of community factors that were considered, the level of socio-economic development proved to have the stronger influence. The coefficients of the best fitting logit-linear models for this variable were of greater magnitude than those for the variable measuring access to family planning clinics. The effects of these two variables were in the expected direction: the higher the level of development of a woman's community of residence and the closer she is to a family planning clinic, the greater are the odds that she is using an efficient method of contraception.

One of the long standing issues in assessing the family planning programmes is their impact on contraceptive prevalence as compared to the impact of development. Arguments have been presented largely on theoretical grounds and little empirical investigation has been carried out. When, indeed, empirical observations are brought in, only simple statistical correlations among the variables in question are often presented. It is common knowledge that statistical correlations do not infer causality and therefore the causal structure of the phenomenon determining use of contraception remains a vaguely understood process.

No claim is made here that causality has been determined. Rather, the results suggest that the practice of contraception is influenced by both socio-economic development and family planning programmes. Both have substantial and significant effects, although the former seems to have a stronger impact on use.

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APPENDIX A

RPFS/WFS
Form No. 4
January 1978

National Census and Statistics Office
University of the Philippines Population Institute
and
Commission on Population

CONFIDENTIALITY
This inquiry is authorized
by Commonwealth Act
No. 591.
All information is
strictly CONFIDENTIAL.

REPUBLIC OF THE PHILIPPINES FERTILITY SURVEY
WORLD FERTILITY SURVEY
COMMUNITY LEVEL QUESTIONNAIRE
(FOR RURAL BARANGAYS)

IDENTIFICATION BLOCK:

A.1 Stratum Number

A.2 Region Number

A.3 Province

A.4 City/Municipality

A.5 Barangay

A.6 Name of Respondent

(Barangay Chairman)

100 Transportation and Communication

101. Which of the following facilities are available in the barangay? ENCIRCLE APPROPRIATE BOX. If none, indicate the estimated distance, time and mode of travel required to reach the nearest place where the facility is available.

Barangay Facilities	In barangay		If none in barangay:		
	YES	NO	Distance in Kms. to nearest barangay that has one.	Estimated time for average resident to travel there.	Mode of travel in reaching them.
Telephone	<input type="checkbox"/>	<input type="checkbox"/>			
Telegraph	<input type="checkbox"/>	<input type="checkbox"/>			
Post Office	<input type="checkbox"/>	<input type="checkbox"/>			
Mail Delivery	<input type="checkbox"/>	<input type="checkbox"/>			
Newspaper for sale or public reading	<input type="checkbox"/>	<input type="checkbox"/>			
Movie (at least once weekly)	<input type="checkbox"/>	<input type="checkbox"/>			
Coffee-house or restaurant	<input type="checkbox"/>	<input type="checkbox"/>			

110 Health

111. Is any of the following type of health facilities found in the barangay? ENCIRCLE APPROPRIATE BOX. If none, indicate the estimated distance, time and mode of travel required to reach the nearest place where the facility/personnel is available.

Types of facility or Personnel	In barangay ?		If none in barangay:		
	YES	NO	Distance in Kms. to nearest barangay that has one.	Time required for average person to travel to places or personnel.	Mode of travel in reaching them.
Qualified doctor	<input type="checkbox"/>	<input type="checkbox"/>			
Qualified midwife and nurse	<input type="checkbox"/>	<input type="checkbox"/>			
Traditional birth attendant/Hilot	<input type="checkbox"/>	<input type="checkbox"/>			
Qualified health worker (Specify)	<input type="checkbox"/>	<input type="checkbox"/>			
Hospital	<input type="checkbox"/>	<input type="checkbox"/>			
Family Planning Clinic	<input type="checkbox"/>	<input type="checkbox"/>			
Primary Care Center	<input type="checkbox"/>	<input type="checkbox"/>			
Pharmacy or Drugstore	<input type="checkbox"/>	<input type="checkbox"/>			

120 Education

121. Are there any of the following schools in the barangay? ENCIRCLE APPROPRIATE BOX. If none, what is the estimated distance, time and mode of travel required for children to reach the nearest school?

Kind of School	In barangay ?		If none in barangay:		
	YES	NO	Distance in Kms. to nearest barangay that has one.	Estimated time for average child to travel to this school.	Mode of travel in reaching them.
Primary School	<input type="checkbox"/>	<input type="checkbox"/>			
Elementary School	<input type="checkbox"/>	<input type="checkbox"/>			
Secondary School	<input type="checkbox"/>	<input type="checkbox"/>			
Others:	<input type="checkbox"/>	<input type="checkbox"/>			
(Specify)					

130 Family Planning

131. Which of the following are available in the community? ENCIRCLE APPROPRIATE BOX.
If none, what is the estimated distance, time and mode of travel required to the nearest place which has the service or facility.

Service or Personnel or Facility	In barangay		If none in barangay:		
	YES	NO	Distance in Kms. to nearest barangay that has one.	Time required for average person to travel to facility or personnel.	Mode of travel in reaching them.
Clinic, hospital or other general or specialized service for family planning	<input type="checkbox"/>	<input type="checkbox"/>			
Other doctor providing such service	<input type="checkbox"/>	<input type="checkbox"/>			
Full Time Outreach Worker (FTOW) and Barangay Supply Point (BSP)	<input type="checkbox"/>	<input type="checkbox"/>			
Pharmacy selling contraceptives	<input type="checkbox"/>	<input type="checkbox"/>			

140 Access to Government Agencies

141. Is any of the following governmental agencies present in the barangay? ENCIRCLE APPROPRIATE BOX. If none, indicate the estimated distance, time and mode of travel required to reach the nearest barangay where the agency is available.

Government Agency	In barangay		If none in barangay:		
	YES	NO	Distance in Kms. to nearest barangay that has one.	Time required for average person to travel to office or agency.	Mode of travel in reaching them.
Tax Collection Office	<input type="checkbox"/>	<input type="checkbox"/>			
Police station precinct	<input type="checkbox"/>	<input type="checkbox"/>			
Land Registration Office	<input type="checkbox"/>	<input type="checkbox"/>			
Court with local jurisdiction	<input type="checkbox"/>	<input type="checkbox"/>			
Office for registration of births and deaths	<input type="checkbox"/>	<input type="checkbox"/>			
Office of the municipal city mayor	<input type="checkbox"/>	<input type="checkbox"/>			

150 Modernization Level

151. Is electricity present or absent in this barangay? ENCIRCLE APPROPRIATE BOX.

Present ☐ 1 Absent ☐ 2

152. What is the source of water used for cooking and drinking in this barangay?
ENCIRCLE MORE THAN ONE BOX IF NECESSARY.

Water Source	Cooking	Drinking
Pipe Water	<input type="checkbox"/> 1	<input type="checkbox"/> 1
Arsenian well	<input type="checkbox"/> 2	<input type="checkbox"/> 2
Pump	<input type="checkbox"/> 4	<input type="checkbox"/> 4
Open well	<input type="checkbox"/> 8	<input type="checkbox"/> 8
Rainwater	<input type="checkbox"/> 16	<input type="checkbox"/> 16
Spring	<input type="checkbox"/> 32	<input type="checkbox"/> 32
Others: _____	<input type="checkbox"/>	<input type="checkbox"/>

3 Individual and Contextual Effects of Education on Proximate Fertility Determinants and on Life-Time Fertility in Kenya

R. Lesthaeghe, C. Vanderhoeft, S. Becker and M. Kibet

3.1. INTRODUCTION

In 1979 Susan Cochrane compiled an extensive overview of the available empirical research on the education effects on fertility in LDCs. A number of characteristics of this compilation are of interest here.

First, a large majority of the authors writing on the issue before 1979 had noted that the effect of schooling is far from uniform across countries or across regions or subcultures within a region. In other words, the elasticities depended on other variables which form an economic, ecological, cultural or historical context. More surprising, however, is how little attention had been paid in studies pertaining to LDCs to the specification of this context, to the incorporation of interaction effects between individual (micro) and contextual (macro) variables and to the exploration of the structure of such interactions. Of all the sources cited in Cochrane, only three address the issue in a more systematic way. One source (Simmons and de Jong) is undated and the other two (Goldberg, Anker) were written in 1976 and 1977 respectively,¹ i.e. at a time when several other studies, dealing with Western fertility or other dependent variables,² had already made substantial contributions to contextual analysis. In addition, Cochrane devotes one page in the accompanying text to 'spill-over' effects of education. Judging from the diagram attached to the text, such 'spill-over' effects clearly refer to effects of community levels of education, but only two such effects are mentioned explicitly:

the education of one person may give that person access to contraceptive information, but once having such information, it can be passed on to friends (p 30)

and:

Alternatively, when one person's education increases, their market opportunities improve, but other people's opportunities may be slightly worse (p 30).

In the remainder of the volume, there is no further specification of how the contextual effect of education may operate. Reference group behaviour and patterns of imitation, effect of the spread of Western behavioural models, effects of erosion of traditional authority structures and social controls, presence of family planning infrastructure or effects of education-selective in- or out-migration do not occupy a very prominent place in this compilation, despite the fact that many other authors – be it in a qualitative way – had drawn attention to such contextual effects.

A second feature in the Cochrane compilation is that only magnitudes of the micro-effect of education on fertility seem to vary across contexts, but not the signs: higher education is expected to lead to lower fertility. In fact, the book starts off with three quotes, all saying that there is a near-universal and overwhelming negative relationship.

More recent research, however, has shown that the nature of the micro-relationship is much more complex. Much of the evidence for zero or positive education effects on fertility stemmed originally from African research. (For a compilation of several papers pertaining to West Africa, see Page and Lesthaeghe (1981) and especially the chapters by P. and J. C. Caldwell, O. A. Adegbola *et al*, S. Gaisie and I. Orubuloye. But before this volume appeared, other authors such as P. E. Ohadike, P. O. Olusanya and A. Romaniuk had already pointed in this direction.) More recently, the Kenyan WFS studies produced additional evidence. (See Mosley *et al* (1982) and Henin *et al* (1982).) Outside Africa virtually zero fertility differentials by education are also found in Indonesia and in Pakistan in the mid-1970s, i.e. in two

¹ But see Srikantan (1967) for a much earlier study of the contextual effects on fertility in LDCs which is not cited by Cochrane.

² See bibliography in Freedman (1974). This bibliography also includes the major methodological contributions that were available until 1974.

countries with a tradition of prolonged breastfeeding and long periods of post-partum non-susceptibility. (See Lesthaeghe *et al* 1981.) Another noteworthy case, not so much because of a reversal of the classic fertility differential by education, but because of its steep fertility increase during the take-off phase of the transition, is that of the Muslim republics in the Soviet Union (Tadzhik, Kirgiz, Turkmen, Uzbek and Kazakh SSRs. See Coale *et al* 1979). For a general discussion of the large variety of traditional fertility checks which may be subject to erosion, see Nag (1980) and for a discussion of their relationship with modernization, see Lesthaeghe (1980).

Characteristic of such research is that it decomposes fertility in its proximate determinants, so that forces pulling in opposite directions are brought to the surface. Traditional starting, spacing or stopping patterns tend to erode with advancing education (both individual and contextual), while new forms of parity-dependent fertility control via contraception or sterilization, which tend to increase with education, are not always capable of neutralizing this initial fertility increasing effect. Hence, in situations of an incipient fertility transition, fertility levels may go up, down or remain horizontal with respect to educational levels, depending on the balance between the fertility-increasing and decreasing effects. In fact, several years before the World Bank compilation was published, Freedman warned (1974):

‘Areas with similar average fertility levels may differ in having positive, negative or zero correlations between fertility and education.’ (p 12)

As a result, we should now be much more cautious about the presumed universality of the negative fertility–education micro-relationship,³ especially in dealing with populations which have had powerful checks

on natural fertility levels and with areas where the economic props of parity-specific control are weak or where cultural and religious barriers toward contraception are still widespread. Both sub-Saharan Africa and much of the Islamic World, for instance, are likely to fall in these categories. The fact that studies from these cultural areas were – of necessity – under-represented in the Cochrane book may be another reason for the dominance of the negative education–fertility relationship.

3.2. PRELIMINARY METHODOLOGICAL CONSIDERATIONS

The statistical problem of contextual analysis consists of detecting, measuring and summarizing how micro-level relationships vary across contexts. The most simple and straightforward strategy proceeds therefore with the estimation of the micro-relationships in each contextual setting and with the search for structure of the parameters of the micro-relationships across contexts. Supposing two parametric variables at the micro-level with a linear relationship, one can estimate the micro-structures for each of the k contexts as:

$$Y_k = A_k + B_k X + \varepsilon_k \quad (1)$$

and inspect subsequently whether or not A_k and B_k follow a pattern across the k contexts. If the macro-variable happens to be measured on an interval or ratio scale, one can of course regress the sets A_k and B_k on that macro-variable. Such a procedure is called the separate equation model (Boyd and Iversen 1979: chapter 3) as it takes off from context-specific equations and produces two new equations for the intercepts A_k and the slopes B_k respectively. The main disadvantage of this procedure is, however, the fragmentation of the overall sample size over k subsamples, and many coefficients may not be significantly different from zero. Yet, despite non-significance, the within context slopes and intercepts may still produce a systematic and plausible pattern when plotted against the macro-variable, and one can devise tests of significance for the overall pattern rather than for the individual A_k or B_k . For each increase in the macro-variable, one can for instance establish how many times A_k or B_k moves in the expected direction (n successes out of N trials) and what the probability of such an outcome will be. Hence, this basic strategy may not necessarily be the most efficient one statistically, but its use as an exploratory device can be

³ Even in late or post-transitional situations, uniformly negative fertility–education relationships do not always emerge: the well-known U or J-shaped fertility differentials across educational and income levels in Europe and the US in the 1950s can serve as a reminder. Also the possibility of an interesting religion–education interaction should be pointed out: better educated persons may tend to have received their education in some countries in religious institutions (eg Catholic schools) and may therefore exhibit higher, not lower, fertility. This phenomenon not only emerged in the 1950s as a contributor to the U or J-shaped education differential, but was of interest during the entire fertility transition in Belgium for example. Missionary schools in LDCs may produce similar effects and the same may hold at lower educational levels of Koranic schooling for example. Such ‘type of school’ effects are hardly discussed in the Cochrane compilation.

recommended. This will become clearer once the risks are discussed of other strategies which are more efficient, but which also rely on strict structural assumptions.

If we assume that the contextual variable is parametric and if it is in fact constructed from the individual X -variable as the contextual average of X (ie \bar{X}_k) one can partition the individual's co-ordinates into a part that measures the individual's deviation from the contextual average (ie $X - \bar{X}_k$) and into a part that measures the deviation of the contextual mean from the overall mean (ie $\bar{X}_k - \bar{X}$). Boyd and Iversen (1979: 66-67) suggest the use of such a partition. However, if the original X and \bar{X}_k are transformed into two new variables, the centring of the means of $(X - \bar{X}_k)$ and of $(\bar{X}_k - \bar{X})$ at zero for *all* contexts also implies a transformation of the original dependent variable Y . This transformation of Y into Y' is however context-specific as it involves \bar{X}_k and B_k . The centred single equation model is then (given the presence of interaction):

$$Y' = A + B_1 (X - \bar{X}_k) + B_2 (\bar{X}_k - \bar{X}) + B_3 (X - \bar{X}_k) (\bar{X}_k - \bar{X}) + e' \quad (2)$$

The main advantage is that the centring eliminates the problem of multi-collinearity that would otherwise emerge with the simultaneous introduction of the original X and its set of averages, \bar{X}_k ; and that any partitioning of sums-of-squares over the individual deviation, contextual deviation and interaction terms will be independent of the order of introduction into an analysis of covariance. If the main interest is, however, the study of elasticities or regression coefficients, the matter is slightly more complicated: one can only recover the original dependent variable Y from Y' by adding in the k context-specific values of $(B_k X_k)$. In other words, the B -coefficients are not directly interpretable as Y' is not an identical transformation of Y for all observations. More important, however, is the fact that the slopes B_k needed for the conversion of Y into Y' are still estimated on the basis of the original separate equations for each context: they obviously continue to be affected by sample fragmentation and hence the problem of reduced efficiency of estimation is carried forward throughout the entire centring procedure.

Others have tackled the problem of more efficient estimation. The solution here seems to lie in the direction of using *a priori* structural information or in joint estimation at the micro-level. The philosophy behind it is that the micro-relationships have a number of characteristics in common across contexts and one

therefore allows them to borrow information from each other or from an *a priori* piece of information.

Demographers are relatively fortunate since they study phenomena which have underlying age/time patterns that come up with regularity. These patterns can be described by mathematical functions or model schedules and a relatively small number of parameters. The relational technique, involving model schedules capturing time-dependency, is particularly useful here: if the data for each of the k contextual groups have the property of following the model schedule but modified by context-specific parameters, several statistical techniques belonging to the class of accelerated failure time models can be used. For age at first union and age at first birth (Bloom 1970), the Coale nuptiality schedule (1971) can be used (see Rodríguez and Trussell 1980) and for breastfeeding and post-partum abstinence, the Lesthaeghe-Page model schedule (1980) is likely to do equally well (see Vanderhoeft 1982). (The Lesthaeghe-Page breastfeeding schedule has been tested, subsequent to its publication, in an extra number of countries with information on breastfeeding. See Rudwan (1981) and Sobhan (1981).) Apart from being more robust statistically these procedures also allow use of current status with a 1-0 format. This has again a dual advantage: current status data have higher validity than retrospectively reported durations and the selection bias stemming from truncation can be alleviated (ie a mean age or duration can be calculated on the basis of the whole sample and not only for those who have terminated the event under consideration).

An important problem with this kind of solution is the question *which* parameters that link the data to the *a priori* information will be allowed to vary across contexts, and it is at this point that one can be more or less 'interventionist'. If a great deal of flexibility is allowed, outliers in small samples will again dictate the outcome; and if too many parameters are fixed, genuine variations may be artificially suppressed. In other words, the degree of interventionism applied at the micro-level will have its repercussion at the next stage, ie when the search for a macro-structure begins. Too much interventionism may then lead to a researcher-generated rather than a data-generated macro-structure.

The drawbacks may occur when *a priori* information is used other than that stemming from tested model schedules. Mason *et al* (1982) for example presumed that the fertility-education relationship at the micro-level can be shaped on *a priori* grounds and this assumption put them on the road of Bayesian procedures with relationships for one country borrowing information from another country. Mason *et al*

(1982) reject the OLS produced micro-relationships because they show heterogeneity with respect to the fertility-education relationship (negative, positive and U-shaped OLS relationships emerged) and blame OLS for coming up with something which is – demographically and sociologically speaking – more likely to be genuine than false. However, as their contexts are nations and as the within-context sample sizes probably range from about 4000–10 000 women, their rejection of the OLS results seems precipitous.

In this application, we thought it better to take a more ‘pedestrian’ view of the matter and the general strategy used in this application to the Kenyan fertility data can be summarized as follows:

- 1 micro-relationships should follow the within-context data as closely as possible;
- 2 whenever model schedules are available, they will be used as robust *a priori* information;
- 3 current status data are preferred because of higher validity;
- 4 more attention will be paid to significance testing of the *entire* (ie across context) pattern exhibited by the various within-context slopes and intercepts (or other parameters) than to significance testing of individual parameters for each context.

3.3 DEFINITION OF CONTEXTUAL LEVELS INVOLVED IN SUBSEQUENT ANALYSES

The main aim of the paper is to verify to what extent the impact of schooling for women on life-time fertility and various proximate determinants of fertility will vary across the contextual levels of female education and across region. The contextual level of education should ideally reflect the educational level typical for the individual’s direct social environment, ie the village or neighbourhood. As such, it should be an important indicator for the local level of development. In reality, contextual schooling levels are mere averages of individual experience and they may capture features other than the degree of educational development. In fact, it may very well be that high average values are precisely indicative of local heterogeneity and as such they could also measure economic, social or ethnic segregation *within* a given village or neighbourhood.

In operational terms, the Kenyan Fertility Survey 1977-8 (KFS) does *not* identify villages or neighbourhoods as such but 104 sampling strata divided into 64 rural and 40 urban ones (Central Bureau of Statistics

1980a: vol 1, appendix). Most of the rural strata consisted of two clusters, which were not always adjacent areas, but they belonged to the same agro-climatic zone.

The KFS sample used the National Integrated Sample Survey Programme (NISSP) framework of 1975-9. Other samples from NISSP included the four integrated rural surveys (IRS), a literacy survey of 1976, two surveys on the nutritional status of children of 1977 and 1979, the national demographic surveys of 1976 and 1977, a labour force survey of 1977-8, and a health facilities survey of 1976-7. Unfortunately, the sample sizes per rural cluster in these other NISSP surveys are very small (± 20 persons) and comparability with the KFS results does not exist to a sufficient extent to build contextual variables for the KFS analysis. Education data for women from IRS4 and from the KFS, for instance, were only very slightly correlated despite the fact that similar clusters (but different women) were used. Much of this is due to the fact that the KFS has on average a much larger number of respondents per cluster and that the respondents were women themselves rather than heads of households. As a consequence, we preferred to construct the contextual level of education on the basis of the KFS data. From 1980 onward, the NISSP sampling frame was replaced by another frame, NASSEP (see Central Bureau of Statistics 1980b) in which several deficiencies of NISSP were remedied.

The urban sampling units were drawn specifically for the KFS and they were meant to capture socio-economic strata. As already indicated, the contextual level of education of these 104 strata is measured as the average number of years of schooling for married women. For the purpose of the present analysis, we have grouped them into two or three broader educational groups, depending on the province of location. The net result of this combination is a new stratification into 12 groups, as shown in table 3.1. The number of women in these groups varies from about 100 to 800.

The introduction of provincial groups in this mixture requires more detailed comments. First of all, anyone familiar with Kenya knows of the existence of very large climatic, ecological, economic, historical and cultural differences between the various regions (see Kaplan *et al* 1967 for details). As a result one can expect that fertility behaviour might not only be related to individual and contextual levels of education, but also to regional characteristics operating at the macro-level. The use of provinces in the subsequent analysis will capture a portion of such variation. It should be said that the use of ethnic groups rather than

Table 3.1 Overview of the contextual strata used in the present analysis of the KFS data

Strata identification (contexts)	Sampling strata	Women married at least 5 years	Women ever in a sexual union	Currently married women
Central and Eastern Provinces				
1 – \bar{X} years of schooling ^a < 3 years	7	443	585	525
2 – $3 \leq \bar{X} < 5$	9	548	748	666
3 – $\bar{X} \geq 5$	9	372	542	485
Western and Nyanza Provinces				
4 – \bar{X} years of schooling < 3 years	11	726	961	905
5 – $3 \leq \bar{X} < 5$	11	601	825	764
6 – $\bar{X} \geq 5$	5	233	334	312
Rift Valley Province				
7 – \bar{X} years of schooling < 3 years	7	352	498	452
8 – $\bar{X} \geq 3^b$	10	451	671	611
Coast Province				
9 – \bar{X} years of schooling < 3 years	10	295	413	380
10 – $3 \geq \bar{X} < 5^c$	8	107	161	135
Nairobi				
11 – \bar{X} years of schooling < 7 years ^d	10	191	343	298
12 – $\bar{X} \geq 7$	7	93	160	147

^aMeasured for all 8100 women in the KFS dataset (V704).

^bIncluding 1 stratum with \bar{X} years of schooling > 5 years.

^cContains only strata in Mombasa.

^dIncluding 2 strata with \bar{X} years of schooling < 5 years.

provinces is probably to be recommended, but as many clusters showed marked ethnic heterogeneity (mainly urban clusters), we reverted back to provincial units as an additional contextual level. The ethnic variable is, however, being introduced in other analyses of the KFS not reported in this paper. A brief discussion of the regional contrasts is required.

The first region is the Lake Victoria Basin and it is made up of Western and Nyanza provinces. The entire region benefits from ample rainfall and is densely populated (± 200 persons/km² on average). Its population, mainly made up of Luo, Luhya, Kisii and Kipsigis ethnic groups, has a strong tradition in farming or in the combination of farming and cattle raising. Population pressure on land is not negligible and the region is characterized by out-migration. This implies that the proportion of persons belonging to other ethnic groups and moving in from other areas is limited; and that out-migration – mainly to urban areas in

other provinces – is probably education-selective. Of importance is also that the so-called 'White highlands', ie the white settlers' area or Large Farm Area, fell outside these densely populated zones (see Kaplan *et al* 1967; figure 12) and that therefore the impact of early colonization has not been as marked as in Central Kenya. Moreover, particularly among the Luo, the direct or indirect assaults on local customs by the variety of Christian missions resulted in a strong African revivalist movement. The Lake Basin is furthermore a high malaria area with infant and childhood mortality levels (${}_2q_0$) of the order of 150 to more than 200 per thousand in 1977 (Kibet 1981: appendix C). Female literacy varied from 22 per cent in the district of Busia to 37 per cent in the district of Kisii according to the 1979 census (*ibid*), whereas health facilities indicators tend to fall below the national average.

The second region is made up of the Central and

Eastern provinces. In comparison with the Lake Basin, population densities are equally high in the Central province ($180/\text{km}^2$), but considerably lower in the much drier Eastern province (only $17/\text{km}^2$). Both provinces are inhabited by linguistically related Bantu groups: Kikuyu in Central province and Meru-Embu and Kamba in Eastern province. Historically, much of the manpower used by the white settlers in the Large Farm Areas and by the colonial administration in Nairobi was recruited from these two provinces. Till now the area has remained the direct hinterland for migration to the Capital and to some extent also to Mombasa (especially Kamba). As indicated for the Lake Basin, in-migration into these two provinces has been limited and, as such, most areas exhibit a high degree of ethnic homogeneity (see figure 3.4). The early contact with European influence explains to some extent why current education levels for both sexes range from well above average (mainly in Kikuyu and Meru-Embu areas) to average (Kamba). The Kikuyu and Meru-Embu reacted to missionary schools by the foundation of their own independent school system from as early as 1930. This feature is unique in Africa. Moreover, both ethnic groups spearheaded the struggle for independence and with the abolishment of the White Highlands, Kikuyu and Meru-Embu farmers again took advantage of the opportunity, largely as a result of factors such as population pressure on their own land, skill and motivation, political and financial power. The availability of health facilities ranges from below average in the remote parts of Eastern province to well above average in Central province. The incidence of malaria is low and early childhood mortality (${}_2q_0$) in the late 1970s ranges from 67 per thousand in Central to about 100 per thousand in Eastern province (Kibet 1981).

The third region is made up of the Rift Valley. Except for a narrow strip north of Nakuru, rainfall is much lower than in the Lake Basin or in Central province. As a result, the area represents the typical aspects of the savannah zone and it has been traditionally inhabited by Nilotic speaking populations who were often engaged in cattle keeping. Most of the former White Highlands were located in the central parts of the Rift Valley and they separated the Kalenjin groups of mixed cultivators to the North from the Maasai pastoralists to the South. Literacy levels in the area were low but have been catching up rapidly: the 1979 census revealed figures of female literacy ranging between 20 and 40 per cent. The exceptions, however, still exist with low levels of female literacy of 6 per cent in the district of West Pokot and 8 per cent in Narok (and 2 and 5 per cent in Turkana and Samburu districts which fall outside the KFS covered

area). Infant mortality is intermediate between the high levels of the Lake Basin and the low levels of the central highlands: ${}_2q_0$ ranges from 80 per thousand in Laikipia district in 190 per thousand in West Pokot. Also health facilities are unequally distributed. On the whole, the Rift Valley contains zones of recent and rapid development. Sizeable populations originating from the high density areas between which it is sandwiched have made their way to both rural and urban Valley areas. The recent depression of the world economy, which has had a profound impact on Kenya, may have slowed down this development considerably, but the traces of the growth period in the form of increased ethnic heterogeneity and cultural influence on pastoralists seem irreversible.

The fourth area is made up of the Coast province. It presents many idiosyncratic features generated by its long history of Islamic ruling. Arab trading with the Kenyan coast can be dated back as far as the 4th century, and by the 8th century the present five coastal towns were already established as independent political entities. Later on Persian (Shirazi) influences also penetrated to the Coast, but except for about 150 years of Portuguese ruling (from ± 1500 onward), Arab influence resulted in a sizeable Muslim population, especially among the Mijikenda tribal cluster (mostly Sunni) and among the Asian population (mainly Shia sects such as Ismaili). In-migration into the area by Kamba, Luo and Kikuyu contributed, however, to increased cultural heterogeneity and so did the presence of Hindu Asians. The Coastal area and the Tana River valley have a relatively high incidence of malaria and early childhood mortality is nearly as high as in the Lake Basin: ${}_2q_0$ varies in the late 1970s from 120 per thousand in the inland Taita hills to over 200 per thousand in Kilifi and Lamu districts (Kibet 1981).

Another important element for the present analysis is that the area has been characterized by higher incidences of permanent childlessness than the interior of Kenya, a feature which continued down the Tanzanian coast as well. Recently, primary sterility levels have been decreasing and the proportion of women childless after 5 years of marriage may have fallen below the 10 per cent level. The KFS data on childlessness after 5 years of exposure in a sexual union are lower than 10 per cent, but under-reporting is virtually unavoidable with respect to such sensitive issues. The figures of childlessness among women 25-29 are reported for the 1969 and 1979 censuses by the Country Studies Working Group on Kenya of the US National Academy of Sciences (undated, appendix 3).

Finally, female literacy levels are lowest of the whole southern part of Kenya: in rural areas, the

figures of the 1979 census do not reach 10 per cent female literacy and only the urban areas of Taita Taveta and Mombasa have levels of 20 per cent or above. Higher literacy is furthermore linked with the presence of in-migrant populations. One of the consequences of this factor for the present analysis is that the higher educational stratum (number 10 in table 3.1) for the Coast province is in fact entirely located in Mombasa.

The last area is made up by Nairobi itself. It scores highest on virtually all development indices: ${}_2q_0$ is below 100 per thousand, female literacy reached 68 per cent in 1979 and health facilities have the highest density. Ethnically, the population is mixed: apart from Asian and European minorities, the dominant African groups are the Kikuyu, Kamba, Luo and Luhya. Of importance for the contextual analysis is also that only 2 out of the 17 clusters had average female schooling levels of just under 5 years, while 7 had an average of more than 7 years. Despite such averages, living conditions vary across the entire range from poverty to affluence.

The first dependent variable of interest is life-time fertility: the data lend themselves best to regular OLS estimation, to the use of a classic contextual design, and the findings will define the problems which have to be dealt with in the subsequent sections.

3.4 INDIVIDUAL AND CONTEXTUAL EFFECTS OF EDUCATION ON LIFE-TIME FERTILITY

The classic operationalization of life-time fertility is the straightforward use of children ever born (CEB), but as this variable is strongly heteroscedastic with age or exposure duration, we prefer the indirectly standardized version proposed by Boulier and Rosenzweig (1978). Their duration-ratio (DRAT) is constructed as the individualized counterpart to Coale's I_g measure of marital fertility: it is the ratio between the observed number of children ever born to the number that would be expected if women had natural fertility (Coale, Hill and Trussell 1975) during the age span of their exposure:

$$DRAT = CEB / \int_m^a f(a) da \quad (3)$$

where m is the age at first entry into a sexual union

(marriage, a is current age and $f(a)$ is the age-specific schedule of natural fertility. Ideally, DRAT eliminates any effects of age and marriage duration, but this does not always happen in real populations. This is because the pattern of natural fertility is not only dependent on age but also on age at marriage, which means that a set of model schedules $f(a,m)$ ought to be used. Moreover, as reporting completeness declines with age and as cohort fertility may change, DRAT will not follow a horizontal line even for women with identical ages at marriage. In other words, differences in the composition of the female population with respect to age and age at marriage leave an impact and may distort comparisons between groups. Such remaining effects can, however, be suppressed if DRAT values are regressed on age and age at marriage (or marriage duration) in addition to being regressed on other variables of interest.

The basic micro-relationship takes the form:

$$DRAT_k = A_k + B_{1k} EDUC + B_{2k} AGE + B_{3k} MARDUR \quad (4)$$

for each of the 12 ($=k$) contextual strata identified in table 3.1 and for women married at least 5 years. (As the fertility pattern of women with short marriage durations is not clearly established, CEB and DRAT may be relatively volatile. As a general rule it is advisable to compute DRAT values for women who are married for at least 5 years.) Of the 12 intercepts A_k , all 12 are significantly different from zero at the 0.05 level (hardly a surprise) and the corresponding numbers are 4 for B_{1k} , 7 for B_{2k} and 8 for B_{3k} .

Levels of relative marital fertility can now be compared across contexts holding the three individual characteristics constant (schooling, age, marriage duration). The first two comparisons involve the fertility levels for marriage duration 5 and 15 years, for ages 25 and 35 and for illiterate women ($EDUC = 0$). The results are presented in figure 3.1 and they reveal the following features (panels A and B):

- 1 Marital fertility levels in Kenya are often higher than that of the standard: a value of $DRAT = 1$ corresponds with a TMFR of 11.8 children.
- 2 Average DRAT values are higher for younger than for older women, which is the reflection of the fact that $\bar{X}DRAT$ often decreases with age in LDCs (even if fertility is natural).
- 3 Marital fertility in the Coast province is lower than elsewhere, which is exactly what all analyses with Kenyan data have shown. It may be noted here that five of the seven districts making up the Coast

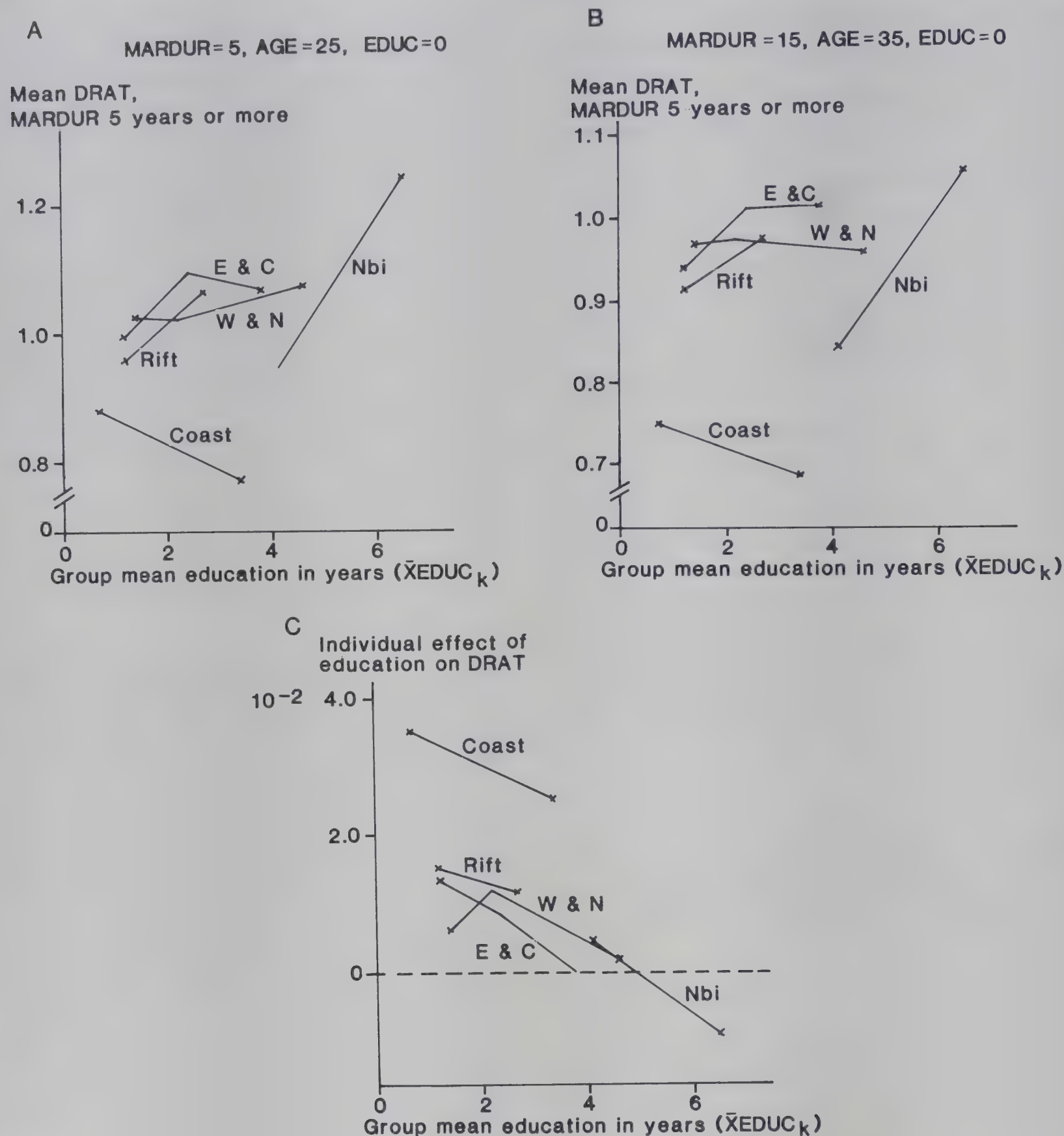


Figure 3.1 Life-time fertility index (DRAT) — levels for illiterate women and effect of one year of additional schooling, by province and contextual level of education, KFS 1977-8

province had TFRs of less than eight in 1979. Only six other of the remaining 34 districts had such figures. Moreover, the age at marriage (SMAM) tends to be lower in the Coast than in most other districts. (Taita Taveta and Tana River have a higher SMAM and a TFR > 8, but these are

inland zones mostly inhabited by non-Mijikenda groups; see the report of the Country Studies Working Group on Kenya of the US National Academy of Sciences (undated: 120) and Kibet (1981) for district estimates of the TFR. For the 1969 TFR district values, which set the Coast apart to an even

greater extent, see Anker and Knowles (1982: 8-9). Hence, a comparison of the 1979 and 1969 district TFRs shows a clear fertility increase, while levels of childlessness show a decrease.

Coast districts	TFR		Childlessness (women 25-29)	
	1969	1979	1969	1979
			%	%
Kalifi	6.4	7.4	14	8
Kwale	6.2	7.4	9	8
Lamu	4.5	7.7	6 ^a	12
Tana River	6.5	8.2	14	8
Taita River	7.0	8.0	10	8
Mombasa	4.9	5.4	13	15

^aThis figure for Lamu is suspect as the district had the second highest level for the age group 45-49 in 1979, which points at a long history of substantial childlessness.

- 4 The levels of $\bar{X}DRAT$, do not vary in a systematic way with an increase in contextual education ($\bar{X}EDUC_k$): of the 14 within-province but across contextual education sequences of panels A and B, eight show an increase and six show a decrease in relative marital fertility. This mix holds for younger and older illiterate women alike. For a significant overall pattern to emerge with 14 sequences (trials), only four or less exceptions can be tolerated if $p < 0.05$.

Hence, relative marital fertility levels, net of individual schooling, vary across the provincial split between the Coast and the interior, but they do not vary systematically across contextual education levels. The 12 A_k values may all be significant individually, but their contextual pattern is not.

The opposite is true for B_{1k} : few of the coefficients of individual schooling levels were significant, but their overall pattern definitely is (see figure 3.1: panel C):

- 1 At low contextual levels of schooling, an additional year of education leads in all provinces to an *increase* in $\bar{X}DRAT$; the effect becomes neutral at intermediate contextual levels (ie around 4-5 years of schooling) and an additional year of schooling *decreases* relative marital fertility levels at higher contextual education levels.
- 2 Six of the seven sequences (ie across $\bar{X}EDUC_k$ but within provinces) of B_{1k} go in the expected direction just indicated: the higher the educational average of the context, the weaker the fertility increasing effect of an additional year of schooling or the stronger its fertility decreasing effect.

- 3 The fertility increasing effect of individual female schooling is particularly strong for the Coast: $\bar{X}DRAT$ increases with 2-4 percentage points for each year of schooling added. This finding is in line with that of others indicating that fertility levels in the Coast are catching up with those of the rest of the country (see again 1969 and 1979 TFRs above).
- 4 An additional year of schooling in the other provinces produces a relatively homogeneous effect as can be seen from the fact that the provincial lines in panel C are very nearly superimposed.

On the whole, our suspicion stated in the introduction that educational improvements in Kenya may at first increase marital fertility is clearly borne out by the slopes B_{1k} . Moreover, the occurrence of the turning point can be expected with respect to this micro-relationship in interior areas which are on the verge of achieving full primary education for most of their women.

3.5 INDIVIDUAL AND CONTEXTUAL EFFECTS ON THE DURATION OF BREASTFEEDING

For the estimation of the length of breastfeeding in each of the 12 strata, current status data for all surviving children born in the last 4 years are used. As outlined elsewhere (Lesthaeghe 1982), such data avoid the truncation and selection effects that arise if data are utilized from the last closed birth interval or from the present open interval alone. The covariates are grouped: female education in three categories (0, 1-4, 5+ years of schooling) and mother's age in another three categories (< 25, 25-34, 35+).

The models dealt with are generalized linear models of the form:

$$\log(-\log(1 - \pi_z(t))) = (\beta_z) \log(-\log(1 - \pi_s(t))) + \beta_z \cdot z \quad (5)$$

where $\pi_z(t)$ is the proportion of children weaned at or before age t among children whose mothers have covariate characteristics z ; $\pi_s(t)$ is the proportion of children weaned at or before age t in a standard population;

$$\beta_z = \sum_{j=1}^m \beta_j z_j$$

$$\beta_z = \sum_{j=1}^m \beta_j z_j$$

and $\vartheta_1 \dots \vartheta_m, \beta_1 \dots \beta_m$ are the linear parameters to be estimated. The standard schedule $\pi_s(t)$ is the Lesthaeghe–Page Lagos standard, which could be represented by two parameters α_1 and α_2 as follows:

$$\log(-\log(1 - \pi_s(t))) = \alpha_2 \log t + \alpha_1 \quad (6)$$

This implies that the duration of breastfeeding t follows a two parameter Weibull distribution (Vanderhoeft 1983). The maximum likelihood estimates are $\hat{\alpha}_1 = -3.48$ and $\hat{\alpha}_2 = 2.21$ if the duration is measured in three monthly intervals. The model now becomes:

$$\begin{aligned} \log(-\log(1 - \pi_z(t))) &= (\vartheta_z)(\hat{\alpha}_2 \log t + \hat{\alpha}_1) \\ &+ \beta.z \end{aligned} \quad (7)$$

Special models can be considered depending on the slopes ϑ_z . The simplest one is obtained by assuming that the slopes are identical and equal to unity. Then (7) reduces to:

$$\log(-\log(1 - \pi_z(t))) = (\hat{\alpha}_2 \log t + \hat{\alpha}_1) + \beta.z \quad (8)$$

and only the intercept $\beta.z$ will be estimated. This is a proportional hazard model (PH):

$$\lambda_z(t) = \lambda_s(t).e^{\beta.z} \quad (9)$$

where $\lambda_s(t)$ is the hazard function for the Lagos standard (here a Weibull hazard defined by two parameters $\hat{\alpha}_1$ and $\hat{\alpha}_2$ – see Vanderhoeft 1983 for details). Another possibility consists of estimating an overall slope ϑ which does not depend on the covariates:

$$\log(-\log(1 - \pi_z(t))) = \vartheta.(\hat{\alpha}_2 \log t + \hat{\alpha}_1) + \beta.z \quad (10)$$

where ϑ and $\beta.z$ have to be estimated. Equation (10) defines a modified proportional hazards model (MPH) with:

$$\lambda_z(t) = \lambda_s^*(t).e^{\beta.z} \quad (11)$$

Such a MPH is the original PH model with a new standard which is a modification of the original Lagos standard (the modified standard is now a Weibull hazard defined by two parameters $\alpha_1^* = \vartheta\hat{\alpha}_1$ and $\alpha_2^* = \vartheta\hat{\alpha}_2$). The three models were tested with the KFS data in earlier work by Vanderhoeft involving four covariates but including age of mother and mother's education. It was found that the latter two covariates

had a significant impact on the intercepts only so that a MPH model was retained here (equation (10)) instead of the full model (equation (5)). The MPH model was run for each of the 12 strata separately and the interaction term between the covariates age and education of mother was dropped as it was significant at the 5 per cent level in only one of the 12 strata. The programme generates life tables and distribution parameters, but in this application we will only use the mean duration of breastfeeding. Obviously, proportions of children still being breastfed at various ages could have been used instead if more detail was required.

The estimated means are presented in table 3.2. Controlling for province, age and individual education, these mean durations of breastfeeding decrease in 47 of the 61 sequences across $\bar{X}EDUC_k$. There is hence a clear negative contextual effect on lactation. Controlling for contextual education, province and age, average durations of lactation decrease in 51 of the 70 sequences across individual education groups, so that there is an obvious net negative effect of individual schooling as well.

If we are willing to neglect the age factor by collapsing the information for the three age groups using a uniform age distribution (ie that of the KFS: the KFS age distribution used here is <25: 0.41; 25-34: 0.31 and 35+: 0.28), the data of table 3.2 reduce to those of table 3.3. A first feature of interest is the possible existence of interaction between individual and contextual education effects. Such an interaction would emerge if the differences in lactation durations between educational groups for individuals become either systematically smaller or larger as one moves up on the contextual education scale. This does not occur in any of the three ways of calculating such differences (illiterate versus 1-4, 1-4 versus 5+ or illiterate versus 5+). (The OLS analysis on breastfeeding duration in the last closed interval also indicated that the slopes of individual education did not vary in any systematic way across the 12 strata.) In other words, an increase in the contextual level of education brings down breastfeeding durations of illiterate women, but it does not bring them any closer to that of better educated women in the same stratum. (The post-partum abstinence data for the Yoruba of Nigeria produces an identical finding. Despite a decrease in durations, differences between the less and the more educated women remained virtually constant as one moved from rural Ekiti and Ibadan Divisions to urban Ibadan and to metropolitan Lagos.)

In the absence of such interaction, the data of table 3.3 can be submitted to an additive median polish (Tukey 1977) in order to extract the overall median

Table 3.2 Estimated mean durations in months of breastfeeding by mother's age and education, provincial groups and contextual levels, for surviving children born in the 4 years preceding the survey; results of the modified proportional hazard model, KFS 1977-8

Provincial groups	Women aged < 25 years		
	Illiterate	1-4 years schooling	5+ years schooling
Central and Eastern Provinces			
$\bar{X}EDUC_k$ (contextual educ) < 3 yrs	21.0	18.6	17.0
$3 \leq \bar{X}EDUC_k < 5$	17.3	18.3	14.8
$\bar{X}EDUC_k \geq 5$	(14.7)	(11.8)	12.8
Western and Nyanza Provinces			
$\bar{X}EDUC_k < 3$ yrs	18.5	16.4	16.1
$3 \leq \bar{X}EDUC_k < 5$	18.2	17.5	14.7
$\bar{X}EDUC_k \geq 5$	21.7	18.5	16.9
Rift Valley Province			
$\bar{X}EDUC_k < 3$ yrs	17.1	14.0	14.8
$3 \leq \bar{X}EDUC_k < 5$	12.4	13.0	12.0
Coast Province			
$\bar{X}EDUC_k < 3$ yrs	21.5	20.2	17.5
$3 \leq \bar{X}EDUC_k < 5$	15.5	(13.7)	12.4
Nairobi			
$\bar{X}EDUC_k < 7$ yrs	14.0	15.2	13.7
$\bar{X}EDUC_k \geq 7$	(9.9)	(7.0)	8.9
Provincial groups	Women aged 25-34		
	Illiterate	1-4 years schooling	5+ years schooling
Central and Eastern Provinces			
$\bar{X}EDUC_k < 3$ yrs	19.4	17.2	15.7
$3 \leq \bar{X}EDUC_k < 5$	15.8	16.7	13.5
$\bar{X}EDUC_k \geq 5$	(17.4)	14.0	15.2
Western and Nyanza Provinces			
$\bar{X}EDUC_k < 3$ yrs	21.6	19.0	18.7
$3 \leq \bar{X}EDUC_k < 5$	18.2	17.5	14.7
$\bar{X}EDUC_k \geq 5$	22.6	(19.3)	17.6
Rift Valley Province			
$\bar{X}EDUC_k < 3$ yrs	20.6	16.9	17.9
$3 \leq \bar{X}EDUC_k < 5$	14.6	15.3	14.1
Coast Province			
$\bar{X}EDUC_k < 3$ yrs	22.2	(20.9)	18.1
$3 \leq \bar{X}EDUC_k < 5$	10.7	(9.5)	8.6
Nairobi			
$\bar{X}EDUC_k < 7$ yrs	13.4	14.6	13.2
$\bar{X}EDUC_k \geq 7$	(14.8)	(10.5)	13.2

Table 3.2 (Cont)

Provincial groups	Women aged 35 +		
	Illiterate	1-4 years schooling	5 + years schooling
Central and Eastern Provinces			
$\bar{X}EDUC_k < 3$ yrs	22.0	19.5	17.9
$3 \leq \bar{X}EDUC_k < 5$	18.3	19.5	15.7
$\bar{X}EDUC_k \leq 5$	23.7	19.0	(20.6)
Western and Nyanza Provinces			
$\bar{X}EDUC_k < 3$ yrs	22.4	19.7	19.4
$3 \leq \bar{X}EDUC_k < 5$	22.0	21.2	17.8
$\bar{X}EDUC_k \geq 5$	21.8	(18.6)	17.0
Rift Valley Province			
$\bar{X}EDUC_k < 3$ yrs	21.5	17.6	(18.6)
$3 \leq \bar{X}EDUC_k < 5$	13.9	14.6	(15.4)
Coast Province			
$\bar{X}EDUC_k < 3$ yrs	22.1	(20.8)	(18.0)
$3 \leq \bar{X}EDUC_k < 5$	(21.7)	—	(17.4)
Nairobi			
$\bar{X}EDUC_k < 7$ yrs	16.8	18.3	(16.5)
$\bar{X}EDUC_k \geq 7$	(16.7)	(11.8)	(13.9)

NOTE: Values between parentheses are estimates based on the Lagos standard schedule but with less than nine out of the 16 (three-monthly) duration points.

Table 3.3 Estimated mean durations (in months) of breastfeeding by mothers' education, provincial groups and contextual education levels, after standardization for age differences: KFS 1977-8

Provincial groups	Illiterate	1-4 years schooling	5 + years schooling
Central and Eastern Provinces			
$\bar{X}EDUC_k < 3$ yrs	20.8	18.4	16.8
$3 \leq \bar{X}EDUC_k < 5$	17.1	18.1	14.6
$\bar{X}EDUC_k \geq 5$	18.1	14.5	15.7
Western and Nyanza Provinces			
$\bar{X}EDUC_k < 3$ yrs	20.6	18.1	17.8
$3 \leq \bar{X}EDUC_k < 5$	19.3	18.5	15.6
$\bar{X}EDUC_k \geq 5$	22.0	18.8	17.1
Rift Valley Province			
$\bar{X}EDUC_k < 3$ yrs	19.4	15.9	16.8
$\bar{X}EDUC_k \geq 3$	13.5	14.2	13.6
Coast Province			
$\bar{X}EDUC_k < 3$ yrs	21.9	20.6	17.8
$\bar{X}EDUC_k \geq 3$	15.7	(14.2)	12.6
Nairobi			
$\bar{X}EDUC_k < 7$ yrs	14.6	15.9	14.3
$\bar{X}EDUC_k \geq 7$	13.3	9.4	11.6

Table 3.4 Individual and contextual education effects on mean duration of breastfeeding as estimated from modified proportional hazards with the Lagos model schedule and from additive Tukey median polish, surviving children born in the last four years: KFS 1977-8

Provinces	Effects and residuals				Fits			
	EDUC=0	1-4	5+		EDUC=0	1-4	5+	\bar{X}_{EDUC_k}
Central and Eastern	+ 1.0	+ 1.0	- 1.4	17.1				
(0.88)	+ 1.6	- 0.8	0	+ 1.1	19.2	19.2	16.8	0-3 yrs
	0	+ 1.0	- 0.1	- 1.0	17.1	17.1	14.7	3-4.9
	0	- 3.6	0	0	18.1	18.1	15.7	5+
Western and Nyanza	+ 2.1	- 0.4	- 1.6	18.5				
(0.54)	0	0	+ 0.9	0	20.6	18.1	16.9	0-3 yrs
	0	- 0.9	0	- 1.3	19.3	16.8	15.6	3-4.9
	+ 0.7	0	- 0.5	+ 0.7	21.3	18.8	17.6	5+
Rift Valley	+ 1.8	+ 0.3	+ 0.5	15.1				
(2.43)	+ 1.3	- 0.7	0	+ 1.2	18.1	16.6	16.8	0-3 yrs
	- 1.4	+ 0.8	0	- 2.0	14.9	13.4	13.6	3+
Coast	+ 2.0	+ 0.6	- 1.6	16.8				
(1.72)	0	+ 0.1	- 0.5	+ 3.1	21.9	20.5	18.3	0-3 yrs
	0	- 0.1	+ 0.5	- 3.1	15.7	14.3	12.1	3+
Nairobi	+ 0.2	- 1.2	- 0.9	13.8				
(1.93)	- 0.8	+ 1.9	0	+ 1.4	15.4	14.0	14.3	< 7 yrs
	+ 0.6	- 1.9	0	- 1.3	12.7	11.3	11.6	7+

NOTE: Effects of age of mother are controlled (see text); values between parentheses under province names are ratios of the maximum contextual effect over the maximum individual effect; values > 1 indicate that contextual effect of education is larger.

level (ALL) and the respective individual (COLUMN) and contextual effects (ROW) in each of the provinces. The results of the polish are given in table 3.4. An example will illustrate the meaning of the numbers given in table 3.4. The overall median value of the average durations in Central and Eastern provinces is 17.1 months. If illiterate women living in low educational contexts are considered, this overall level would be altered by adding in the individual effect (+ 1.0) and the contextual effect (+ 1.1), which gives the fitted value of 19.2 reported in the right-hand table. The difference between the observed mean and the fitted one is 20.8 - 19.2, which is the residual shown in the body of the left-hand table.

The diagnosis concerning the absence of an interaction effect between individual and contextual education across provinces is confirmed as the residuals do not show any further pattern. As a result, we ignore them and continue the analysis with the fitted values.

These are plotted in the three panels of figure 3.2 after substituting the macro-education subgroups by their respective observed mean value of education for women who contributed at least a surviving child born in the last four years. Several features emerge from this figure in addition to the effects already mentioned:

- 1 Women in the low educational stratum of the Coast and all women in the Lake Basin, irrespective of educational context, have the longest durations of lactation. Women living in the better educated areas of the Rift Valley, Coast and Nairobi have the shortest duration.
- 2 The contextual effect of education is larger than the individual effect in the Rift Valley, Coast and Nairobi.
- 3 The provincial disparities are most marked for women with less than 4 years of schooling; they diminish when individual education increases to 5 or more years.

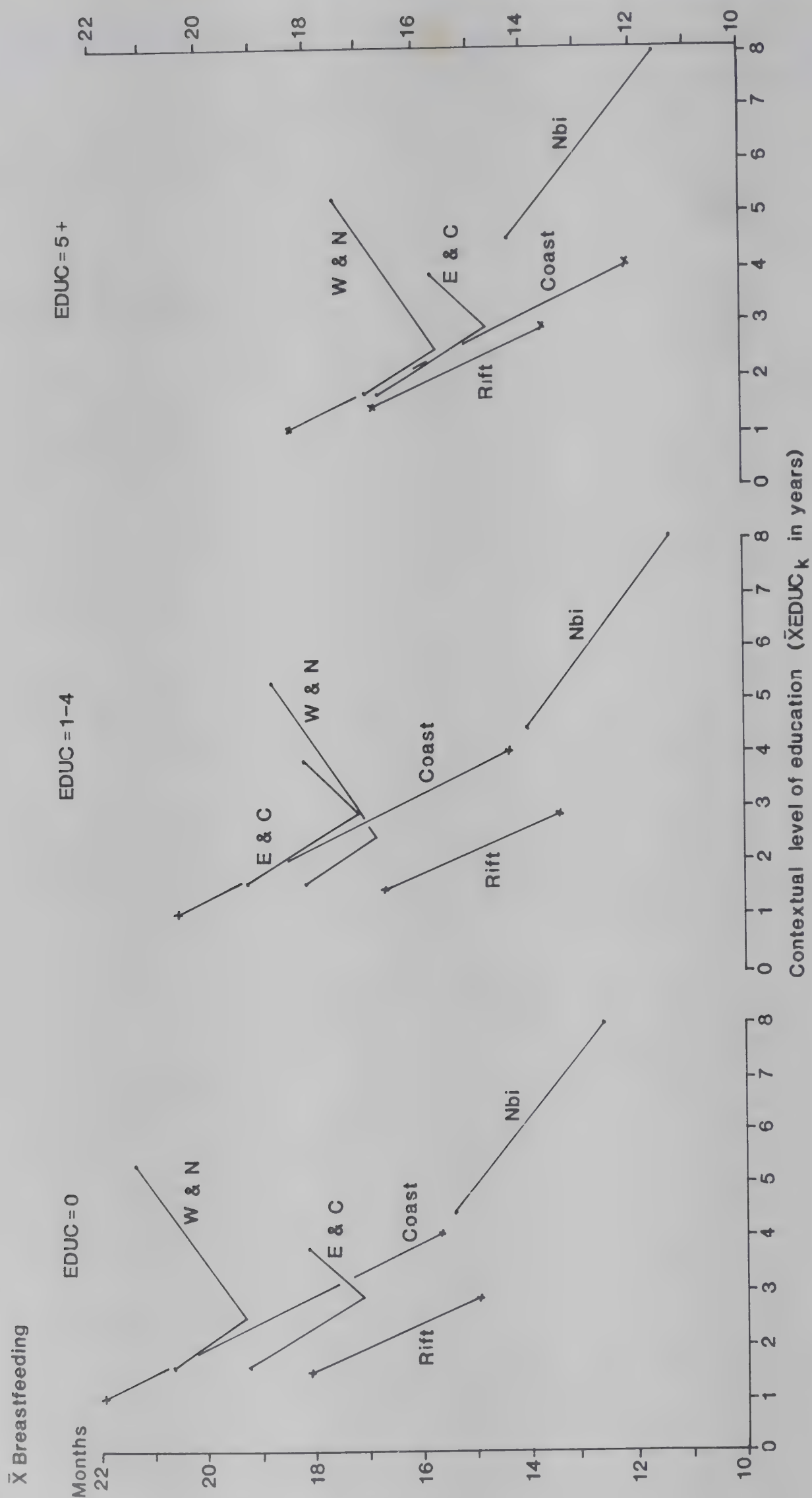


Figure 3.2 Effects of province and contextual level of female education on the average duration of breastfeeding, by individual level of schooling (results after modified proportional hazards and median polish), KFS 1977-8

Table 3.5 Overview of statistical findings for the analysis of the breastfeeding data of the KFS 1977-8 (current status data for surviving children born in the last 4 years)

Main effects	
Effect of EDUC:	present and negative – 51 declining sequences out of 70 ($p < 0.01$) before age standardization and median polish; no clear cut reversals afterwards.
Effect of $\bar{X}EDUC_k$:	present and negative – 47 declining sequences out of 61 ($p < 0.01$) before age standardization and median polish; two clear reversals afterwards (Western and Nyanza, Eastern and Central); negative contextual effect also more important than negative individual effects in Coast, Rift Valley and Nairobi.
Effect of province:	present – for comparable EDUC and $\bar{X}EDUC_k$, Nairobi and Rift Valley have systematically the shortest durations of breastfeeding; Western and Nyanza had the highest; Eastern and Central is intermediate; Coast is special (cf infra)
Interaction effects	
EDUC \times $\bar{X}EDUC_k$:	absent
EDUC \times province:	present – provincial disparities diminish as EDUC increases (especially once EDUC > 5)
$\bar{X}EDUC_k \times$ province	present – Western and Nyanza, Eastern and Central have V-shaped relationships with $\bar{X}EDUC$; for the other provinces the effect of $\bar{X}EDUC$ is strong, but only two data points are available; the $\bar{X}EDUC$ -effect in Coast is particularly strong (but captures also urbanization effect of Mombasa to a large extent).

4 The V-shaped contextual effect in the Lake Basin and in Central and Eastern provinces is puzzling. A summary of main and interaction effects from this analysis is given in table 3.5. We shall now attempt to offer a sociological explanation for them.

The finding that breastfeeding durations decline with advancing individual education is not surprising. But why is the contextual effect larger than the individual one in Nairobi, Coast or the Rift Valley?

A first reason for this is a statistical contamination. As indicated in section 3.3, one of the dominant characteristics of these three regions is that they have received very substantial immigrant populations with different cultural, educational and economic characteristics. The various contextual strata used in this analysis show the traces of this feature to a remarkable degree. As can be seen from figure 3.3, where the degree of ethnic homogeneity is shown for the original 104 sampling strata of the KFS by province, contextual level of education and rural-urban residence, there is a very clear split between the Rift, Coast and Nairobi versus the Lake Basin and Eastern and Central provinces. In the latter areas, 46 out of the 52 sampling strata had a population which belonged for more than 70 per cent to the ethnic group of the region itself. In the Rift Valley, Coast and Nairobi, the sampling strata have a much more mixed ethnic composition as one can indeed expect for immigration zones. The contextual effect of education in these heterogeneous areas is likely to be enhanced as it measures the *joint* impact of

an ethnic + educational environment and not that of educational context alone. This contamination is particularly striking in the Coast province: in the low educational context, one finds a predominance of Muslim Mijikenda women with low literacy, and in the high educational context the population is composed of a mixture of ethnic groups, mostly from the interior, with better education and all residing in Mombasa. The contextual contrast is hence also a contrast between ethnic groups, between locals and immigrants and between rural and urban. In ethnically homogeneous areas of the Lake Basin and of Eastern and Central provinces, such contamination is less likely to occur and the contextual levels of education are then also less likely to exhibit large effects.

There is, however, more to the story than a mere contamination induced by shifts in ethnic composition. At identical levels of both contextual and individual education (see figure 3.2), breastfeeding durations in the Rift Valley, Nairobi and the Coast are much lower than those in the provinces where the migrants originated. The only exception is the more homogeneous set of rural Coastal sampling strata (predominantly Muslim Mijikenda) with $\bar{X}EDUC_k < 3$ years. Hence, Kikuyu, Kamba, Meru-Embu, Luo, Luhya and Kisii migrants must behave in a very different way than those with identical education characteristics 'at home'. Given selectivity of migrants for higher adaptive capacity to new and more heterogeneous environments and a reduced impact of traditional social con-

Contextual level of female education		Percentage of women belonging to largest ethnic group				
		90+	70-89	50-69	<50%	
$\bar{X}EDUC_s < 3$		7 rural				Central and Eastern
	3-4.9	7 rural	1 rural	1 rural		
	5+	6 rural	2 urban		1 urban	
		(23)		(2)		
<hr/>						
<3		9 rural	1 rural			Western and Nyanza
	3-4.9	7 rural 1 urban	3 rural			
	5+	1 rural	1 rural	4 urban		
		(23)		(4)		
<hr/>						
<3		3 rural	1 rural	2 rural	1 rural	Rift Valley
	3+	4 rural		3 urban	1 rural 2 urban	
		(8)		(9)		
<hr/>						
<3		4 rural 1 urban	3 rural 1 urban	1 rural		Coast
	3+		1 urban	1 urban	6 urban	
		(10)		(8)		
<hr/>						
<7		1 urban		3 urban	6 urban	Nairobi
	7+	1 urban		1 urban	5 urban	
		(2)		(15)		

NOTE: Ethnic homogeneity is measured as the percentage of interviewed women belonging to the dominant ethnic group in each of the 104 sampling strata

Figure 3.3 Degree of ethnic homogeneity of 104 KFS sampling strata; distribution by province, contextual level of female education and rural-urban dichotomy

trols and support systems in such setting, durations of breastfeeding are being reduced and new patterns of reference group behaviour may emerge. Such patterns are likely to follow socio-economic and educational lines in environments where older and more traditionally oriented women are absent to a larger extent than in the region of origin. In addition, as they become more of a minority, also the local population is likely to

be affected, and the whole results in an accentuation of contextual effects. To sum up, it seems that cultural homogeneity is conducive to suppress the contextual effect of education, whereas cultural heterogeneity and the presence of immigrant populations are conducive to enhance it. There are, however, brakes on this 'melting pot' effect as the next question indicates.

Why are the breastfeeding duration gaps between the less and the more educated women not narrowing as one moves to better educated neighbourhoods? One might indeed expect that the less educated women are under more pressure to adjust their behaviour to an extra extent as they become more of a minority. As already indicated, reference group behaviour does take place – contextual effects are mostly negative – but the extra reduction of the gap does not occur (no interaction between EDUC and $\bar{X}EDUC_k$). A first hypothesis was set up along age-specific lines: the younger less educated women would adjust more to a better educated environment, while the older less educated would adjust less. In the balance, these effects would neutralize each other when all age groups are considered together. This hypothesis is not in line with the data of table 3.2, however: the education-related gaps across environments are virtually identical for the three age groups. The second hypothesis is based on ecological clustering along socio-economic, educational and ethnic lines *within* the same neighbourhood or sampling area. In heterogeneous settings, and especially in urban clusters, marked segregations of this nature occur in Africa as well as in most other parts of the world. In this fashion, heterogeneous environments produce a melting pot effect with enhanced contextual main effects, but the melting pot effect remains incomplete as a result of segregations between small areas or even living quarters, and the gap between the less and better educated in a given contextual stratum remains.

A final question: why are the disparities with respect to provincial patterns of breastfeeding being reduced for better educated women? According to the classic reasoning in transition theory, one might have expected the opposite: in a traditional society with low female education the regions would be fairly similar, and as education advances, regional disparities would grow. During the last stage, such provincial disparities would shrink again as one moves to overall lowered lactation durations. The problem with such a theory is that it assumes homogeneity at the start. With a variable like breastfeeding this may be a false assumption for two reasons. First, when breastfeeding is long, it may vary from 1 to more than 3 years. Secondly, such variation is likely to have occurred in much of Africa and particularly in Kenya, given its historical differentiations with respect to ecosystems and cultural adaptations (see Molnos 1973 for examples). Hence, it is much more plausible to start from the assumption of regional heterogeneity, and the phenomenon that is likely to occur subsequently is the second part of the transition only, leading to more homogeneous behaviour with reduced durations of lactation.

3.6 INDIVIDUAL AND CONTEXTUAL EFFECTS ON AGE AT FIRST MARRIAGE

The general methodology used in this section follows essentially that of the previous one: in a first round mean ages are estimated from current status data using maximum likelihood methods and Coale's standard nuptiality schedule. In a second round we try to tease out the basic contextual structure from the results of the 12 strata with the Tukey median polish. There is only one covariate in the first round: female individual schooling grouped as 0, 1-4, 5-8 and 9+ years.

The models fitted to the current status data are of the form:

$$\Phi(c_z^{-1} \cdot \pi_z(t)) = (\vartheta_z) \cdot \Phi(\pi_s(t)) + (\beta_z) \quad (12)$$

where $\pi_s(t)$ is the proportion of women married at or before age t^4 in the standard; $\pi_z(t)$ is the proportion in each of the covariate groups and c_z is the proportion ultimately marrying; Φ is an increasing one-to-one transformation from $[0, 1]$ into $[-\infty, +\infty]$, $\vartheta_z = \sum_{j=1}^m \vartheta_j z_j$ and $\beta_z = \sum_{j=1}^m \beta_j z_j$ are linear parameters. The transformation $\Phi(\cdot)$ is defined here as the inverse of the cumulative distribution function $F_W(\cdot)$ of some random variable W , where:

$$F_W(w) = \Phi^{-1}(w) = \int_{-\infty}^w \frac{m_2^{m_2}}{\Gamma(m_2)} \times e^{-m_2(u+e^{-u})} du \quad (13)$$

Further, we assume that:

$$\Phi(\pi_s(t)) = \alpha_1 + \alpha_2 \cdot t \quad (14)$$

Equations (12), (13), and (14) imply that age of entry into first marriage has an exponential reciprocal gamma distribution (Vanderhoeft 1983). Moreover, the model (12) with (13) and (14) is essentially the

⁴'Time' t is, using the terminology for current status data analysis (Vanderhoeft 1983), the current status reference point. In the present analysis of nuptiality, we defined t as the difference between real age (of a woman) and 14, where 14 is the minimum of recorded ages minus 1.

Table 3.6 Estimated mean ages at first marriage for females by education, provincial group and contextual education levels; results of the Coale nuptiality model, KFS 1977-8

Provincial groups	Individual education (EDUC)			
	Illiterate	1-4 years' schooling	5-8 years' schooling	9+ years' schooling
Eastern and Central				
$\bar{X}EDUC_k < 3$ yrs	19.4	19.5	20.3	22.9
$3 \leq \bar{X}EDUC_k < 5$	19.3	19.3	20.5	22.7
$\bar{X}EDUC_k \geq 5$	18.2	19.3	21.2	25.3
Western and Nyanza				
$\bar{X}EDUC_k < 3$ yrs	17.3	17.4	18.4	21.8
$3 \leq \bar{X}EDUC_k < 5$	17.2	17.7	18.6	22.8
$\bar{X}EDUC_k \geq 5$	16.9	17.7	18.6	21.0
Rift Valley				
$\bar{X}EDUC_k < 3$ yrs	18.0	18.6	19.5	22.0
$\bar{X}EDUC_k \geq 3$	18.5	18.4	20.0	22.5
Coast				
$\bar{X}EDUC_k < 3$ yrs	17.0	17.2	19.3	20.8
$\bar{X}EDUC_k \geq 3$	17.5	17.7	18.3	21.2
Nairobi				
$\bar{X}EDUC_k < 7$ yrs	18.2	18.1	19.2	22.5
$\bar{X}EDUC_k \geq 7$	19.7		20.7	23.4

model proposed by Coale and McNeil (1972).⁵ The standard schedule is the Coale-McNeil standard and is defined here by (13) and (14) with $m_2 = 0.604$, $\alpha_1 = -2.4282$ and $\alpha_2 = 0.3481$ (Vanderhoeft 1983). Since m_2 is assumed to be fixed, we only have to estimate the parameters c_z , $\mathfrak{I} = (\mathfrak{I}_1, \dots, \mathfrak{I}_m)$ and $\beta = (\beta_1, \dots, \beta_m)$. Also as virtually all women enter into a union c_z is set to unity for all subgroups. (Note that (12) with a fixed standard, fixed m_2 and c_z is a generalized linear model. Both models for breastfeeding and nuptiality used in this paper are obtained as

special cases of a very general model, as is outlined in Vanderhoeft 1983.) Hence, the final model is:

$$\Phi(\pi_z(t)) = (\mathfrak{I}z) (\alpha_1 + \alpha_2 t) + \beta z \quad (15)$$

where $\Phi(\cdot)$, α_1 and α_2 are fixed and t is a simple uniform transformation of real age. Finally it should be pointed out that the mean ages at marriage are cross-sectional ones, as the age range has not been restricted to a particular cohort.

The results are brought together in table 3.6 and

⁵Suppose that no covariate is considered: $\mathfrak{I} \cdot z = \mathfrak{I}$, $\beta \cdot z = \beta$, $C_z = C$. Then 1, 2 and 3 give:

$$\Phi(C^{-1} \cdot \pi(t)) = \mathfrak{I}\alpha_1 + \beta + \mathfrak{I}\alpha_2 \cdot t$$

Hence the (improper) c.d.f. is:

$$\pi(t) = C \cdot F_W((\mathfrak{I}\alpha_1 + \beta) + \mathfrak{I}\alpha_2 t)$$

and the (improper) p.d.f. is:

$$f(t) = C \cdot \frac{\mathfrak{I}\alpha_2}{\Gamma(m_2)} \cdot \exp \left[- (m_2 \mathfrak{I}\alpha_2) \left(t - \frac{\log m_2 - \mathfrak{I}\alpha_1 - \beta}{\mathfrak{I}\alpha_2} \right) \right] \cdot \exp \left\{ - \exp \left[- (\mathfrak{I}\alpha_2) \cdot \left(t - \frac{\log m_2 - \mathfrak{I}\alpha_1 - \beta}{\mathfrak{I}\alpha_2} \right) \right] \right\}$$

Comparison with (1.16) in Rodríguez and Trussell (1980) gives us their parameters λ , α and \mathfrak{I} .

Table 3.7 Individual and contextual effects of education on mean ages at marriage from fit with the Coale nuptiality schedule and Tukey median polish, KFS 1977-8

Provinces	Effects and residuals				Fits				
	EDUC=0	1-4	5-7	8+		EDUC=0	1-4	5-7	8+ \bar{X} EDUC _k
Central and Eastern	-0.6	-0.6	+0.6	+2.9	20.0				
	0	+0.1	-0.3	0	0	19.4	19.4	20.6	22.9 < 3 yrs
	0	0	0	-0.1	-0.1	19.3	19.3	20.5	22.8 3-4.9
	-1.4	-0.3	+0.3	+2.2	+0.2	19.6	19.6	20.8	23.1 5+
Western and Nyanza	-1.0	-0.5	+0.5	+3.8	18.0				
	+0.3	0	-0.1	0	0	17.0	17.4	18.5	21.8 < 3 yrs
	0	-0.1	0	+0.8	+0.2	17.2	17.6	18.6	22.0 3-4.9
	-0.1	+0.2	+0.1	-0.8	0	17.0	17.5	18.5	21.8 5+
Rift Valley	-0.9	-0.6	+0.6	+3.1	19.1				
	0	+0.4	0	0	-0.2	18.0	18.3	19.5	22.0 < 3 yrs
	0	-0.4	0	0	+0.2	18.5	18.8	20.0	22.5 ≥ 3
Coast	-0.9	-0.6	+0.6	+2.9	18.1				
	0	0	+0.8	0	-0.3	17.0	17.2	18.5	20.8 < 3 yrs
	0	0	-0.8	0	+0.3	17.5	17.7	19.0	21.2 > 3
Nairobi	-0.5	-0.6	+0.5	+3.5	19.5				
	0	0	0	+0.3	-0.8	18.2	18.1	19.2	22.2 < 7 yrs
	-	-	0	-0.3	+0.8	19.8	19.7	20.7	23.8 ≥ 7

the additive Tukey median polish is performed in table 3.7. As the residuals are small (except for two cells) and show no further pattern, we continued with the fitted values. These are plotted against the average educational level of women in each contextual stratum in figure 3.4. A summary of main and interaction effects is also given in table 3.8. Several results for age at first marriage bear a resemblance to those found for breastfeeding durations:

- 1 Provincial differences are striking, with higher ages at first marriage for Central and Eastern provinces (> 19) and lower ones for the Lake Basin and for the low education strata in the Rift Valley, Coast and Nairobi (about 1-2 years less than in the Central and Eastern provinces). These provincial disparities are, however, hardly altered as individual education increases.
- 2 There is a strong effect of individual education, especially once schooling reaches 5 or more years.
- 3 In all cases is the individual effect of education larger than the contextual one. Yet, there is again

a clear differentiation between the two groups of provinces with respect to the contextual education effect: in the ethnically homogeneous environments of the Lake Basin and Central and Eastern provinces the contextual effect of education is entirely absent; in the much more heterogeneous environments of the Coast, Rift Valley and especially Nairobi, the contextual effect is positive. Similar effects as the ones outlined in the previous section may also be in operation with respect to age at marriage.

- 4 There is again no interaction between individual and contextual education: across provinces the gaps between the less and the more educated women are not systematically altered in a particular direction as contextual education levels increase.

On the whole, the interpretation of the contextual effect on age at first marriage in the immigration areas is much more difficult than for breastfeeding: a substantial proportion of marriages had presumably taken place before current residence was established. In this instance, we are dealing with an effect of age at mar-

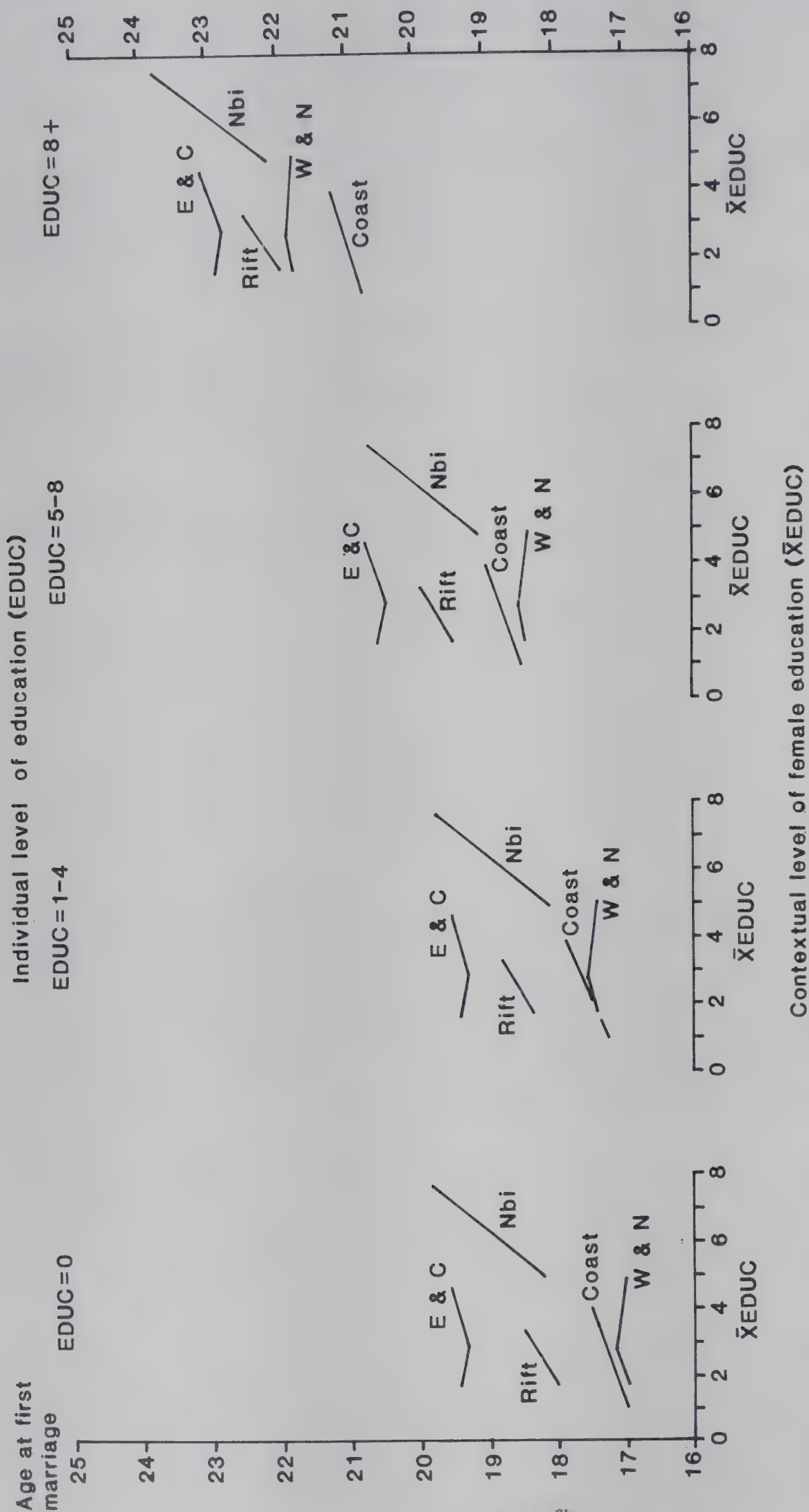


Figure 3.4 Effects of province and contextual level of female education on mean age at first marriage (after fitting the Coale-McNeil model and after additive Tukey median polishes)

Table 3.8 Overview of statistical findings for the analysis of age at first marriage data of the KFS 1977-8 (current status data)

1 Main effects	
Effect of EDUC:	present and positive — of the 35 sequences between the means (before the median polish) 32 are positive; 31 are positive after the median polish;
Effect of $\bar{X}EDUC_k$:	presumably present and positive — of the 28 sequences between the means (before the median polish) only 16 are positive; however, 20 are positive after the median polish;
Effect of province:	present — for comparative EDUC and $\bar{X}EDUC_k$ Eastern and Central provinces have systematically the highest mean age at first marriage, while Western and Nyanza tend to have the lowest (see, however, also interactions EDUC \times province and especially $\bar{X}EDUC_k \times$ province).
2 Interaction effects	
EDUC \times $\bar{X}EDUC_k$:	absent;
EDUC \times province:	virtually absent — provincial disparities remain largely intact as individual education increases;
$\bar{X}EDUC_k \times$ province:	present — contextual effect of education is zero in Eastern and Central or in Western and Nyanza provinces; it is positive in the other three.

riage on subsequent migration or with the effect of exogenous variables on both age at marriage and migration, rather than with the effect of residence in a heterogeneous context on age at marriage. Yet, given the large provincial differences (eg between the Lake Basin and Central and Eastern provinces) with respect to age at marriage, the ethnic composition of the strata in the Rift Valley, Nairobi and Mombasa is almost certainly the main factor responsible for producing the presumed contextual effects of education. The *First Country Report* of the KFS gives values of SMAM for the ethnic groups (vol 1: 74)

Meru-Embu	21.9	Kalenjin	20.2
Kamba	21.2	Kukya	19.0
Kikuyu	20.9	Other	18.5
Kisii	20.2	Luo	18.4
		Mijikenda	17.4

With such large differences, contamination through ethnic composition seems likely for Nairobi, Mombasa and the Rift Valley.

3.7 INDIVIDUAL AND CONTEXTUAL EFFECTS OF EDUCATION ON CURRENT USE OF CONTRACEPTION

The analysis of current use of contraception among currently exposed women is organized as before: first

estimates are produced on the basis of individual covariates (here: education and number of living children) for each of the 12 contextual strata, and the contextual pattern is teased out in a subsequent stage. The dependent variable consists of three categories: no use, use of efficient forms of contraception (pill, injection, IUD, sterilization) and use of less efficient forms (condom, douche, rhythm, withdrawal).

The main statistical problem encountered stems from the very low proportion of users: in the largest contextual stratum with 441 exposed women only 69 users were found, and in one of the smallest strata with 285 individuals only 11 users were present. As a consequence, differentials across educational levels and with respect to the number of living children have to be interpreted very carefully and only the most general trends can be deduced from the data. Given the low proportion of users, logit regression is an obvious choice to estimate proportions belonging to just one contraception category versus the other two combined, but given the involvement of three mutually exclusive categories discriminant analysis can also be utilized. In the latter instance, a Bayesian adjustment was introduced through which the probabilities of group membership are scaled upward or downward on the basis of prior knowledge of the sample distribution of cases. The estimation of probabilities of use in each combination of covariate-categories operates then within these general boundaries.

The estimated probabilities shown for given combinations of number of living children and years of

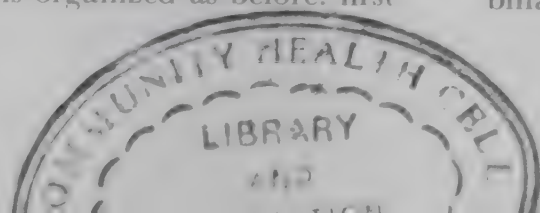


Table 3.9 Percentages of exposed women using efficient methods of contraception by number of living children, individual and contextual education and by province; estimates from logit regression, KFS 1977-8

Province	3 living children				6 living children			
	EDUC = 0	3	5	7 years	0	3	5	7 years
Central and Eastern								
$\bar{X}EDUC_k < 3$ yrs	2.4	4.1	5.9	8.2	4.4	7.3	10.2	14.1
3-4.9	5.4	8.3	10.9	14.3	7.4	11.3	14.7	19.0
5+	6.9	7.7	8.3	8.9	10.7	11.9	12.7	13.6
Western and Nyanza								
$\bar{X}EDUC_k < 3$ yrs	0.9	0.9	0.9	0.9	3.3	3.3	3.3	3.3
3-4.9	2.0	2.2	2.3	2.5	2.0	2.2	2.3	2.5
5+	8.9	9.8	10.3	10.9	8.9	9.8	10.3	10.9
Rift Valley								
$\bar{X}EDUC_k < 3$ yrs	1.0	2.1	3.6	6.0	2.3	5.0	8.4	13.6
≥ 3	2.1	3.7	5.2	7.3	4.3	7.2	10.1	13.9
Coast								
$\bar{X}EDUC_k < 3$ yrs	2.4	4.3	6.3	9.0	2.4	4.3	6.3	9.0
≥ 3	1.6	4.0	7.2	12.7	4.4	10.4	17.8	28.7
Nairobi								
$\bar{X}EDUC_k < 7$ yrs	4.5	7.8	11.1	15.6	10.3	17.0	23.2	30.8
≥ 7	2.3	5.4	9.3	15.7	5.7	12.8	21.0	32.6

formal education are Bayesian posterior probabilities. Specifically, given a vector \mathbf{x}_j (x_{1j} , x_{2j}) of observed living children (x_{1j}) and education (x_{2j}) for the j th woman, the estimate given is:

$$\Pr(\text{belong to group } i | \mathbf{x}) = \frac{q_i p_i(\mathbf{x})}{\sum_{i=1}^3 q_i p_i(\mathbf{x})}$$

where $p_i(\mathbf{x})$ is the value of the multivariate normal probability density for contraceptive group i evaluated at \mathbf{x} , ie

$$p_i(\mathbf{x}) = \frac{1}{2\pi^{1/2} |\hat{\Sigma}|^{1/2}} \times \exp \left[-\frac{1}{2} (\mathbf{x} - \hat{\mu}_i)' \hat{\Sigma}^{-1} (\mathbf{x} - \hat{\mu}_i) \right]$$

and where the q_i are the prior probabilities of membership in group i , set equal, in our case, to the proportions of women in the respective groups. Note that $\hat{\mu}_i$ are the mean vectors for women in group i , that $\hat{\Sigma}$ is the estimated pooled covariance matrix and $m = 2$ covariates.

The results for use of efficient forms of contraception are given in table 3.9, using logit regression, and for efficient and less efficient forms, using discriminant analysis, in table 3.10. The covariate 'number of living children' is set to 3 and 6 respectively and individual female education is set at 0, 3, 5 and 7 years of schooling. The estimates from logit regression and from discriminant analysis can be compared with respect to use of efficient methods of contraception: in general the results are very close and discrepancies of the order of 2 percentage points are only found in a few cells of stratum 6 (Western and Nyanza) and of stratum 12 (Nairobi). From the data of table 3.10, one can also estimate how the excedent of use of efficient methods over less efficient methods tends to evolve with individual and contextual education. Estimates of such excedents are calculated in table 3.12 and presented in figure 3.6, holding the number of surviving children constant at 6. Finally, a summary table can be set up in which percentages of usage are weighted by method efficiency. For the most modern forms of contraception, efficiency was set at 0.95 and for the less efficient methods at 0.70. The results of this weighted combination are given in table 3.11 and in figure 3.5. An interpretation in terms of main and interaction effects is finally offered in table 3.13.

Table 3.10 Percentages of exposed women using efficient and less efficient forms of contraception by number of living children, individual and contextual education and by province; estimates from Bayesian discriminant analysis, KFS 1977-8

Province	3 living children							
	Efficient forms				Less efficient forms			
	EDUC = 0	3	5	7 yrs	0	3	5	7 yrs
Central and Eastern								
$\bar{X}EDUC_k < 3$ yrs	2.1	4.3	6.7	10.2	0.7	2.1	4.2	7.9
3-4.9	5.4	8.4	11.1	14.6	3.0	2.7	2.5	2.3
5+	6.0	7.1	8.0	8.9	3.3	3.4	3.3	3.4
Western and Nyanza								
$\bar{X}EDUC_k < 3$ yrs	0.9	0.9	0.9	0.9	2.3	2.3	2.3	2.3
3-4.9	1.2	1.7	2.0	2.5	3.7	3.8	3.9	4.0
5+	6.4	7.9	8.9	10.1	0.9	1.2	1.3	1.4
Rift Valley								
$\bar{X}EDUC_k < 3$ yrs	0.8	2.2	3.9	7.0	3.1	4.9	6.7	8.8
≥ 3	2.4	3.3	5.4	7.3	3.0	3.9	3.5	3.7
Coast								
$\bar{X}EDUC_k < 3$ yrs	1.9	4.8	8.8	15.6	0.3	0.2	0.2	0.1
≥ 3	1.6	4.6	8.0	14.3	0.7	2.1	3.4	5.6
Nairobi								
$\bar{X}EDUC_k < 7$ yrs	4.5	7.9	11.4	16.1	0.4	1.1	1.9	3.2
≥ 7	4.1	8.2	12.0	18.0	2.4	2.6	2.8	2.8
Province	6 living children							
	Efficient forms				Less efficient forms			
	EDUC = 0	3	5	7 yrs	0	3	5	7 yrs
Central and Eastern								
$\bar{X}EDUC_k < 3$ yrs	4.0	7.8	11.6	16.0	2.2	5.9	11.0	19.1
3-4.9	7.4	11.3	14.8	19.2	5.0	4.6	4.2	3.9
5+	9.7	11.5	12.8	14.2	4.2	4.1	4.1	4.1
Western and Nyanza								
$\bar{X}EDUC_k < 3$ yrs	3.4	3.4	3.4	3.4	3.8	3.8	3.8	3.8
3-4.9	1.9	2.6	3.2	3.9	4.6	4.7	4.8	4.9
5+	8.5	10.3	11.7	13.2	1.4	1.7	1.9	2.1
Rift Valley								
$\bar{X}EDUC_k < 3$ yrs	2.1	5.2	9.2	15.4	2.7	4.3	5.8	7.4
≥ 3	4.8	7.6	10.2	13.6	5.1	5.6	5.9	6.0
Coast								
$\bar{X}EDUC_k < 3$ yrs	1.9	4.8	8.8	15.6	0.3	0.2	0.2	0.1
≥ 3	3.7	9.2	16.6	26.7	1.9	4.3	7.8	12.1
Nairobi								
$\bar{X}EDUC_k < 7$ yrs	9.8	16.8	23.1	30.9	0.5	1.1	1.9	3.0
≥ 7	8.4	15.8	22.7	31.9	2.2	2.4	2.4	2.3

Table 3.11 Percentage of exposed women currently using contraception, weighted by efficiency of method (number of living children = 6); results of Bayesian discriminant analysis, KFS 1977-8

Province	EDUC = 0	3	5	7 yrs
Eastern and Central				
$\bar{X}EDUC_k < 3$ yrs	5.3	11.5	18.7	28.6
3-4.9	10.5	14.0	13.0	21.0
5+	12.2	13.8	15.0	16.4
Western and Nyanza				
$\bar{X}EDUC_k < 3$ yrs	5.9	5.9	5.9	5.9
3-4.9	5.0	5.8	6.4	7.1
5+	9.1	11.0	12.4	14.0
Rift Valley				
$\bar{X}EDUC_k < 3$ yrs	3.9	8.0	12.8	19.8
≥ 3	8.1	11.1	13.8	17.1
Coast				
$\bar{X}EDUC_k < 3$ yrs	2.0	4.7	8.5	14.9
≥ 3	4.8	11.8	21.2	33.8
Nairobi				
$\bar{X}EDUC_k < 7$ yrs	9.7	16.7	23.3	31.5
≥ 7	9.5	18.6	23.2	31.9

NOTE: Efficiency of pill, injection, IUD, sterilization set at 0.95, efficiency of condom, rhythm, withdrawal, douche set at 0.70.

Table 3.12 Excedent of percentage users of efficient forms of contraception over percentage users of less efficient methods, currently exposed women with 6 living children; estimates from Bayesian discriminant analysis, KFS 1977-8

Province	EDUC = 0	3	5	7 yrs
Eastern and Central				
$\bar{X}EDUC_k < 3$ yrs	+ 1.8%	+ 1.9	+ 0.6	- 3.1
3-4.9	+ 2.4	+ 6.7	+ 10.6	+ 15.3
5+	+ 5.5	+ 7.4	+ 8.7	+ 10.1
Western and Nyanza				
$\bar{X}EDUC_k < 3$ yrs	- 0.4	- 0.4	- 0.4	- 0.4
3-4.9	- 2.7	- 2.1	+ 1.6	- 1.0
5+	+ 7.1	+ 8.6	+ 9.8	+ 11.1
Rift Valley				
$\bar{X}EDUC_k < 3$ yrs	- 0.6	+ 0.9	+ 3.4	+ 8.0
≥ 3	+ 0.3	+ 2.0	+ 4.3	+ 7.6
Coast				
$\bar{X}EDUC_k < 3$ yrs	+ 1.6	+ 4.6	+ 6.2	+ 15.5
≥ 3	+ 1.8	+ 4.9	+ 8.8	+ 14.6
Nairobi				
$\bar{X}EDUC_k < 7$ yrs	+ 9.3	+ 15.7	+ 21.2	+ 27.9
≥ 7	+ 6.2	+ 13.4	+ 20.3	+ 29.6

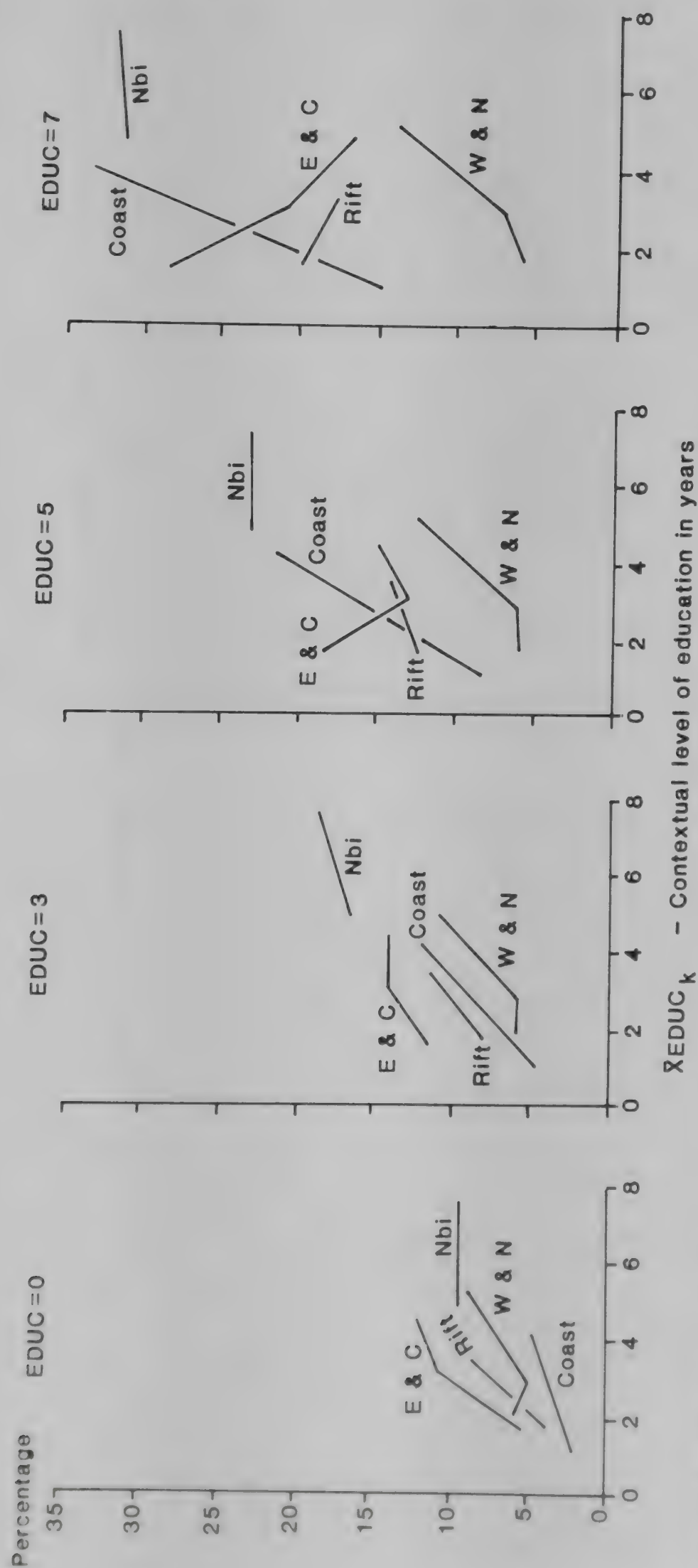


Figure 3.5 Efficiency weighted percentages of current use of contraception among exposed women, by individual and contextual levels of education and by province (results from Bayesian discriminant analysis), KFS 1977-8

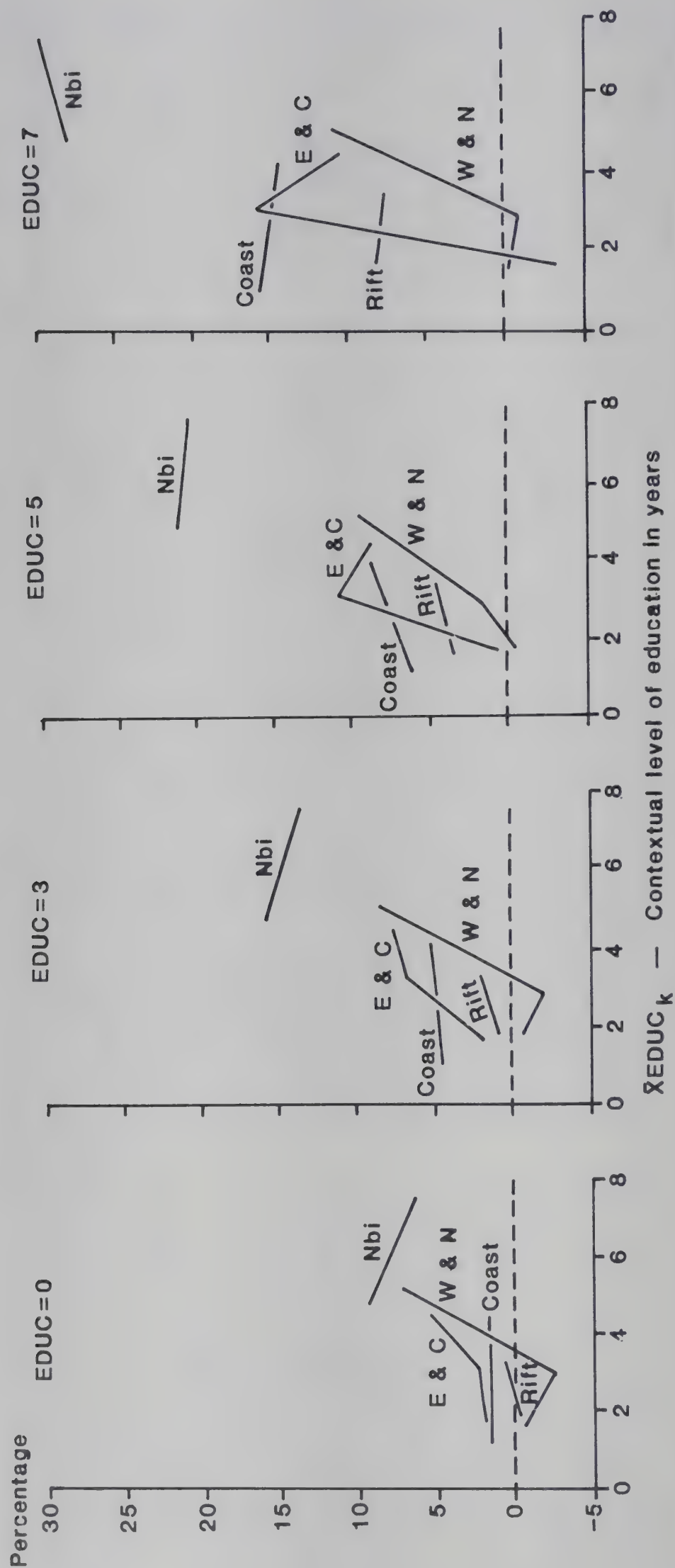


Figure 3.6 Excedent of percentage use of more efficient methods of contraception over less efficient methods, by individual and contextual levels of education and by province (results from Bayesian discriminant analysis), KFS 1977-8

Table 3.13 Efficiency weighted percentage use of contraception among exposed women: summary of effects from analysis of estimates based on Bayesian discriminant analysis, KFS 1977-78**1 Main effects**

EDUC:	positive — use of contraception always rises with individual education, except in the lowest educational stratum of Western and Nyanza where the effect is zero (32 of 36 sequences > 0 ; $p < 0.01$);
$\bar{X}EDUC_k$:	doubtful — controlling for EDUC and Province, only 19 of the 28 sequences have increasing percentages use of contraception when $\bar{X}EDUC_k$ levels increase (N.S.) (but see $EDUC \times \bar{X}EDUC_k$);
Province:	use in Western and Nyanza tends to be lowest at all levels of EDUC and $\bar{X}EDUC_k$; use in Nairobi and Mombasa tends to be highest (but see $EDUC \times$ province).

2 Interaction effects

$EDUC \times \bar{X}EDUC_k$:	possibly present: positive contextual effects of education seem to emerge for women with no more than 3 years of schooling;
$EDUC \times$ province:	present — effects of increments in EDUC on use are smallest in Western and Nyanza, largest in Nairobi and Mombasa; among illiterate women, however, use levels in these two towns are not higher than elsewhere; provincial disparities increase with increasing education;
$\bar{X}EDUC_k \times$ province:	uncertain — increments in $\bar{X}EDUC_k$ produce the smallest change in contraceptive use in Nairobi and the largest ones in the Coast (Mombasa effect), other provinces tend to be intermediate, but have also negative effects of $\bar{X}EDUC_k$ (see main effect $\bar{X}EDUC_k$).

From these materials, the following conclusions can be drawn:

- 1 An increase in individual education virtually always produces an increase in use efficiency of contraception by acting on both components, ie by increasing usage levels and by giving a larger preponderance to the more efficient methods.
- 2 Provincial discrepancies with respect to use and type of method increase rapidly when individual education increases.
- 3 More specifically, at all educational levels and controlling for contextual education, use-efficiency levels are lowest for women of the Lake Basin. This holds again in terms of low overall usage and a lower relative contribution of the more efficient methods. At the other extreme, use-efficiency levels are highest in Mombasa and Nairobi, thanks to higher overall use and a preponderance of the most efficient methods. However, this urban phenomenon is typical for women with 5 or more years of education: it does *not* hold for illiterate women. Women with no or low education tend to have the highest use-efficiency scores in the Eastern and Central provinces, especially if they do *not* live in the lowest educational stratum. On the whole,

such positive effects of educational setting seem to emerge in all provinces but they are restricted to women with no more than 3 years of schooling.

- 4 The strong contextual effect of education noted in Nairobi, the Rift Valley and the Coast with respect to breastfeeding durations and ages at first marriage is now absent in the former two areas. Only in the Coast, with its special Mombasa-effect and strong ethnic shifts, is the contextual effect of education prominent.

These findings require further comment. First of all, use of contraception and choice of method are not solely the result of individual characteristics and of attitudes of one's immediate surroundings, but also a matter of availability and quality of family planning services. Some information on FP availability is present in the KFS itself, but it concerns knowledge of sources (and distance to that source) stated by the respondents themselves. The incidence of such knowledge varies substantially in the 12 contextual strata, but such figures reflect a combination of availability and of individual interest, rather than the former alone. The emergence of a positive association between knowledge of sources of FP and usage levels is then not much of a surprise. Among exposed women with at

least four surviving children, the percentages knowing of a FP source within one hour distance are:

Eastern and Central		Rift Valley	
$\bar{X}EDUC_k < 3$	16.5%	$\bar{X}EDUC_k < 3$	10.7
3-4.9	34.4	≥ 3	27.5
5+	24.9		
Western and Nyanza		Coast	
$\bar{X}EDUC_k < 3$	15.2	$\bar{X}EDUC_k < 3$	10.8
3-4.9	19.9	≥ 3	52.6
5+	29.9		
		Nairobi	
		$\bar{X}EDUC_k < 7$	47.5
		≥ 7	77.2

A second aspect also interferes: use of more efficient methods depends to a greater extent on availability of FP services than usage of less efficient methods. The mix of methods found in a population is then a function of such FP organization and distribution characteristics, in addition to being a function of personal characteristics and cultural influences (eg religious ones). As a result, the interpretation of the present results is considerably more complicated than of those for the previous dependent variables and it constitutes an enterprise in its own right.

Yet a number of observations can still be made. The contrast between the Lake Basin with low use efficiency and Central and Eastern provinces with higher levels almost certainly reflects a contrast with respect to both supply and demand aspects of contraception. The relative disadvantage of the Lake Basin with respect to FP supply is supported by a higher relative reliance on less efficient methods and by a less developed medical infrastructure in general (see Kibet 1981 for health care indicators by district). The discrepancy with respect to demand can be deduced from lower proportions of women who wish to stop childbearing at any achieved parity in the Lake Basin populations (*First Country Report*: A385-6), from a more traditional profile with respect to other fertility-related variables (eg age at marriage, breastfeeding) and from lower levels of economic development in general. The Integrated Rural Survey (IRS4) indicates that income levels in the Lake Basin are significantly below those of Central province, even if one considers identical types of agricultural production (eg coffee, tea). The Rift Valley occupies an intermediate position on two accounts: at comparable levels of individual and contextual education, usage levels fall between those of the Lake Basin and the Central Highlands, and also the method-mix is intermediate. Figures by ethnic group, however, indicate that Kalenjin and Maasai populations in the Rift Valley have patterns that are more

like those of the Lake Basin, whereas populations originally from the Central Highlands have a pattern that resembles that of their 'home' regions. There is presumably a melting-pot effect, but it is certainly not complete. The results for the Coast exhibit the typical ethnic shift: the low use levels for illiterate women correspond largely with the low use among Muslim Mijikenda women. As individual education increases, so does the proportion of non-Mijikenda, the proportion of users and the preponderance of more efficient methods. The net result is that the Coast offers the largest internal contrast with respect to both covariates, individual and contextual education. The results for Nairobi are striking in two respects: all variation is due to individual education and virtually none to contextual levels of schooling, and illiterate women have low use levels considering their presence in the capital. The ready availability of FP supplies in Nairobi may account to some degree for the fact that the contextual education impact is evened out, but it makes the low use-efficiency levels among illiterate women even more surprising. The observation that provincial disparities widen as individual education rises is a classic transition phenomenon: for any variable with an origin at the zero level, change must manifest itself through the widening of the range during the initial phase of the transition.

Finally, it should be stressed again that these observations stem from the analysis of low proportions of users and that sample variations are likely to be substantial. The Kenyan CBS is currently preparing a contraceptive prevalence survey and the comparison with the present KFS data will be indispensable.

3.8 JOINT IMPACT OF LACTATIONAL AMENORRHOEA AND CONTRACEPTION: FURTHER INVESTIGATION

In section 3.4 we have drawn attention to the striking relationship between the effect of an additional year of schooling on life-time fertility (DRAT) and the level of contextual education. We have also hinted at the fact that a fertility increase associated with individual schooling can be produced by an imbalance between the effects of declining breastfeeding and those of rising use of contraception. As a result, the joint impact of lactational amenorrhoea and contraception requires further investigation.

The mean durations of breastfeeding (\bar{B}) reported in table 3.3 are converted into estimates of lactational

amenorrhoea (\bar{A}) using Bongaarts' equation:

$$A = 1.753 \exp (0.1396 \bar{B} - 0.001872 \bar{B}^2) \quad (16)$$

From the values of \bar{A} , the Bongaarts' index of lactational amenorrhoea can be obtained as:

$$C_i = 20/(18.5 + \bar{A}) \quad (17)$$

Similarly, the observed proportions (u) of efficiency weighted (e) current use of contraception among currently married women are converted into the Bongaarts' index of contraception:

$$C_c = 1 - (1.18 \cdot u \cdot e) \quad (18)$$

with $e = 0.95$ for the more efficient methods and

$e = 0.70$ for the others. It is useful to be reminded of the fact that C_i and C_c equal unity if lactational amenorrhoea is 1.5 months only (ie lack of breastfeeding) and if contraceptive use is zero. Values less than unity indicate a growing fertility reduction through amenorrhoea and contraception respectively. The product $C_c \cdot C_i$ measures the joint impact. The Bongaarts' indices are calculated for each of the 12 contextual strata and for illiterate women versus women with at least 5 years of schooling. The difference Δ can then be obtained as:

$$\Delta = (C_c \cdot C_i)_{5+} - (C_c \cdot C_i)_0 \quad (19)$$

and it indicates whether the joint fertility reducing capacity of amenorrhoea and contraception increases with education ($\Delta < 0$) or decreases ($\Delta > 0$). The results are presented in table 3.14, and plotted against

Table 3.14 Effect on education of the Bongaarts' indices of contraception and lactational amenorrhoea, KFS 1977-8

Province	Index of use of contraception C_c^*		Index of lactational amenor- rhoea C_i^\dagger		$(C_i \cdot C_i)$		Education effect as $\Delta = (C_c \cdot C_i)_{5+} - (C_c \cdot C_i)_0$
	EDUC = 0	5 +	0	5 +	0	5 +	
Eastern and Central							
$\bar{X}EDUC_k < 3$	0.97	0.88	0.61	0.68	0.59	0.60	+ 0.01
3-4.9	0.92	0.84	0.68	0.73	0.63	0.61	- 0.02
5 +	0.94	0.85	0.66	0.70	0.62	0.53	- 0.09
Western and Nyanza							
$\bar{X}EDUC_k < 3$	0.97	0.96	0.61	0.66	0.59	0.63	+ 0.04
3-4.9	0.97	0.94	0.64	0.71	0.62	0.67	+ 0.05
5 +	0.96	0.83	0.59	0.68	0.57	0.56	- 0.01
Rift Valley							
$\bar{X}EDUC_k < 3$	0.97	0.92	0.63	0.68	0.61	0.63	+ 0.02
≥ 3	0.94	0.90	0.75	0.75	0.71	0.68	- 0.03
Coast							
$\bar{X}EDUC_k < 3$	0.97	0.89	0.59	0.66	0.57	0.59	+ 0.03
≥ 3	0.98	0.78	0.70	0.77	0.69	0.60	- 0.09
Nairobi							
$\bar{X}EDUC_k < 7$	0.94	0.82	0.73	0.73	0.69	0.60	- 0.09
≥ 7	1.00	0.71	0.75	0.79	0.75	0.56	- 0.19

*From observed proportions of current users among currently married women with $e = 0.95$ for more efficient methods and $e = 0.70$ for less efficient methods.

†From breastfeeding durations of children born in the last 4 years and Bongaarts' equation linking average durations of lactational amenorrhoea to average durations of breastfeeding.

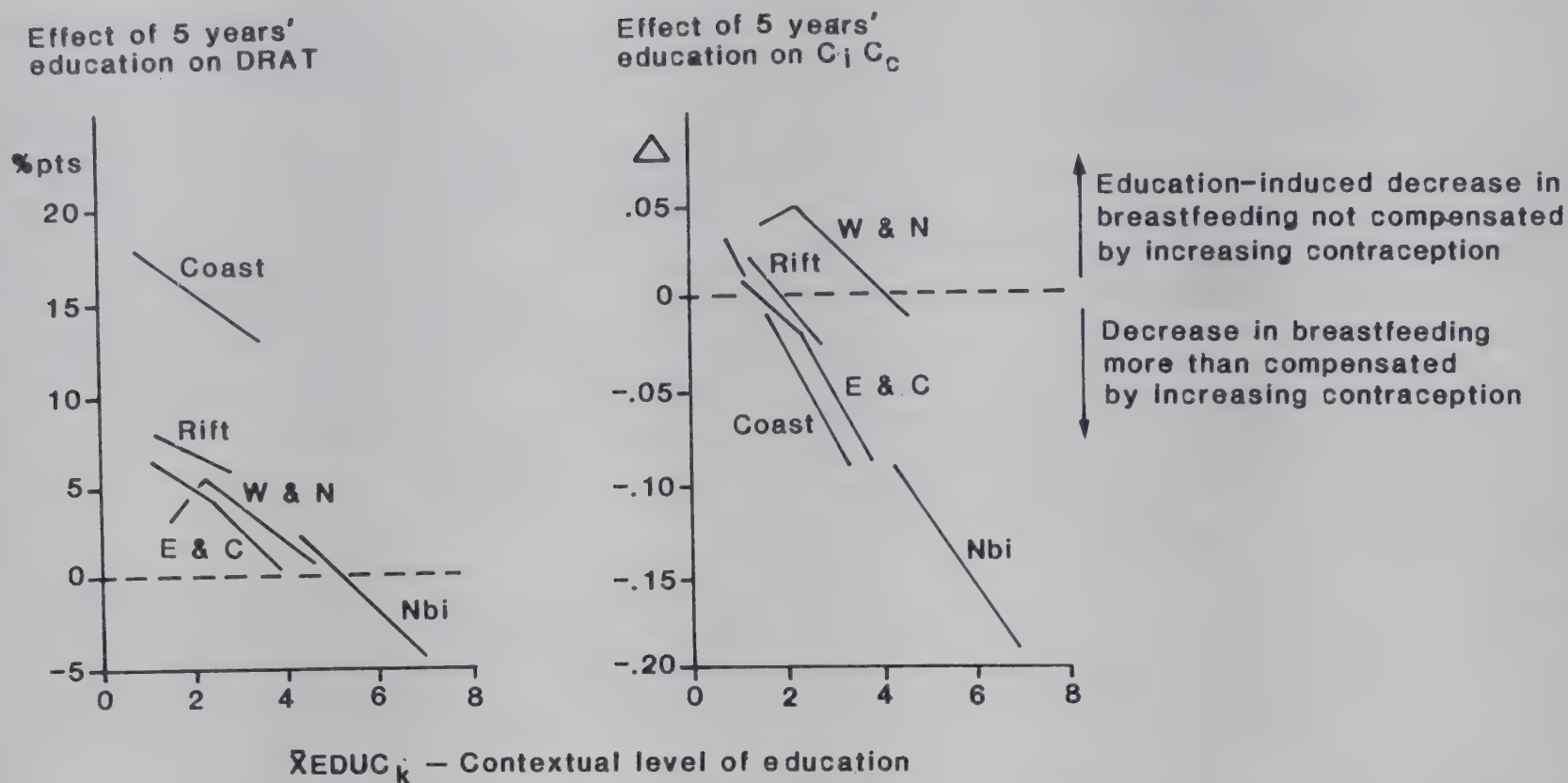


Figure 3.7 Increments in DRAT and $C_i C_c$ produced by increasing female education, by province and contextual level of education, KFS 1977-8

$\bar{X}EDUC_k$ in figure 3.7. To facilitate interpretation, the individual education effects on life-time fertility by $\bar{X}EDUC_k$ are also reproduced on the same figure for an increment of 5 years of schooling (ie $5 \cdot B_{lk}$ from equation (4)).

The patterns of figure 3.7 are interesting in a number of ways:

- 1 The effect of 5+ years of schooling on $C_i \cdot C_c$ is clearly a function of contextual education. At low values of $\bar{X}EDUC_k$, an increase in schooling produces a decline in amenorrhoea which is *not* offset by an increase in contraceptive use efficiency; with rising contextual education, the pattern reverses and increasing contraception outweighs declining amenorrhoea.
- 2 A single function linking Δ to $\bar{X}EDUC_k$ would do for all provinces, except Western and Nyanza. In the latter, a larger increment in $\bar{X}EDUC_k$ is required for producing the pattern reversal. The reason for this feature in the Lake Basin is that the increment in individual female education produces a drop in lactational amenorrhoea durations similar to that in other provinces, but fails to produce a sufficient increase in contraceptive use in general and in use of more efficient methods in particular.
- 3 Δ ranges from +0.05 and to -0.19 across $\bar{X}EDUC_k$: at similar levels of fecundity (say, total

fecundity rate = 17) and sterility, primary education increases total marital fertility by about 0.5 children in the lowest educational strata and reduces it by 3.2 children in the highest educational stratum in Nairobi. The impact of the context on individual schooling effects operating via contraception and lactational amenorrhoea is hence far from negligible.

- 4 The pattern reversal with respect to DRAT occurs at a value of $\bar{X}EDUC_k$ of about 4-5 years, the pattern reversal with respect to Δ occurs at $\bar{X}EDUC_k = 2$ years. DRAT measures fertility stretching back into the more remote past, but Δ captures the educational difference of the contraception - amenorrhoea balance for recent periods. If contraception and amenorrhoea are indeed the major elements through which individual schooling can produce net fertility increases in lower educational contexts, one can assume that the DRAT panel of figure 3.7 gives the historical record and the Δ panel, the current one. From this, one can deduce - *ceteris paribus* with respect to fecundity and sterility - that the positive effect of individual schooling on fertility is currently being curbed in the lower educational strata and that a negative schooling effect is in the making in strata with $\bar{X}EDUC_k > 2$ years. In other words, the transition is progressing and

several provinces could be beyond the maximum of the education-induced fertility bulge.

- 5 Before producing a final assessment, fecundity and sterility should be introduced as they may offset to some extent the educational impact operating through lactational amenorrhoea and contraception ($C_i C_c$). It is likely that fecundity will increase with both individual and contextual levels of education (rising coital frequency, better health) and that sterility (Coast, Nairobi) may go down further.

On the whole, the prediction would be that the fertility transition will proceed more rapidly in Nairobi and in Central and Eastern provinces. Non-Mijikenda women in Mombasa also fulfil conditions that are indicative of an imminent net fertility decline. The populations in the Rift may occupy an intermediate position. The Lake Basin populations and the Coastal Mijikenda are likely to remain behind: in Western and Nyanza provinces the main feature seems to be the lactational amenorrhoea-contraception imbalance and in the Coast the reduction of the sterility factor is also to be taken into account. Last but not least, in all these instances is the transition more likely to be speeded up by residence in higher educational environments, as identical increments in individual female schooling will be producing the strongest negative impact on fertility in such contexts.

3.9 CONCLUSIONS

The variable $\bar{X}EDUC_k$ obviously measures more than the mere impact of the contextual level of education *sensu stricto*. As it increases, so do the socio-economic status of the area, the degree of urbanization and the degree of ethnic, socio-economic and educational heterogeneity of the population. In this sense, the average female level of schooling constitutes a proxy – and probably a good one – for this more complex pattern of socio-economic development of small regional units. In addition to the use of this proxy, the use of major regions or provinces also proved to be essential, not only because this province variable produced considerable additional variation, but also because it captures ethnic and historical factors of development and because it specifies the meaning of $\bar{X}EDUC_k$ (eg possible melting pot effects in certain areas).

The main findings of this paper are that the fertility transition in Kenya is clearly moving away from a first stage of increasing marital fertility and progressing to the next stage characterized by a negative education-fertility relationship. This, however, evolves along an intricate pattern for two reasons:

- 1 the elasticities of the intermediate fertility variables with respect to individual schooling are definitely a function of the macro-variables that capture regional patterns of culture and of social and economic development;
- 2 the elasticities are furthermore differentiated with respect to *each* of the intermediate fertility variables.

Considering regional leads and lags, there is evidence pointing in the direction of an imminent net fertility decline in large parts of Nairobi, Mombasa and the Central and Eastern provinces. Urban populations and immigrant populations originating from the Central Highlands in the Rift Valley may be following. Populations of the Lake Basin, Mijikenda and rural populations of the Coast have not yet reached this point of pattern reversal and may even exhibit a further fertility increase. Much of the magnitude of these prospects depends on the future evolution of lactation, contraceptive use efficiency, fecundity and in some areas (Nairobi, Coast) also on further reductions in sterility. In terms of policy, the present efforts with respect to childspacing may be extended to termination in procreation in areas where the possibility of an incipient fertility decline exists.

The earlier fertility increase in these areas has produced a sizeable subpopulation of women in their thirties with enlarged family sizes (ie 7+ children) which may wish to stop childbearing. In the Lake Basin, with its very high rural population densities, much greater efforts seem to be required, not only with respect to childspacing specifically but with respect to community health in general. In the Coast province, the remainder of the sterility problem needs to be solved. The sooner this is done, the sooner one may move beyond the point of inflection of the fertility bulge. Given the regional diversity of the problems involved, accents in policy formulation may vary across regions, the ultimate goal being the long-term avoidance of growing regional disparities with respect to population growth rates produced by the currently emerging lags in the fertility transition.

Finally, the historical lesson from the Kenyan experience seems to be that the substantial national investment in female education only starts to pay off in terms of reducing marital fertility once a crucial mean level of education for women (mainly primary education) has been reached. In general terms, the turning point seems to be located at about an average contextual level of 5 years of schooling. Research involving data for other African countries will bear out whether this is a phenomenon particular to Kenya or whether such effects are more widespread over the continent.

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4 Community Effects on Fertility

John B. Casterline

4.1 INTRODUCTION

While the collection of community data in conjunction with a national fertility survey is not a WFS innovation, achieving this in 17 countries represents a substantial development in this area. The advance is more dramatic when measured by the amount of completed research: the literature contains only a handful of non-WFS studies utilizing community data, whereas it now appears that some analysis will be completed with the WFS community data from almost every one of the 17 countries. Utilizing these data in the investigation of the determinants of reproductive behaviour is a relatively new enterprise, with meagre previous experience and wisdom upon which to draw in the formulation of models and the development of analytic approaches. It is not surprising, therefore, that much of the research reviewed in this paper and Tsui's (chapter 5) has an exploratory and tentative spirit about it. Undoubtedly our skills in utilizing these data will improve, along with the design of questionnaires and the care given to data collection, so that we shall probably in retrospect view these first efforts as rough and naïve.

In most countries there have been practical obstacles to making use of the WFS community data. This fact should go on record, as in many cases analysts have invested substantial personal effort in seeing that the data were assembled in usable form. The community surveys have typically been regarded, properly, as separate from and secondary to the individual and household surveys. As a consequence, all stages of data collection, from instrument design and fieldwork through data processing, have often been slighted, no doubt to the detriment of data quality. (On these matters, see Chayovan 1982: appendix B.) Most analysts of WFS data can take advantage of enormous investments in the preparation of data files. The users of the community data, in contrast, have in a few instances personally retrieved the community questionnaires from obscure corners of statistical offices

and, more often than not, personally seen to the coding/punching of the data and the sometimes intricate task of matching with the individual and household files. This level of involvement in data collection and processing is not uncommon in the social sciences, but among those who have carried out research with WFS data it is unusual.

This paper reviews findings on community effects on fertility. The review includes two non-WFS studies (Anker 1973; Hong 1976), since these two resemble most WFS studies in conceptualisation and analysis. Otherwise attention is confined to findings from analysis of WFS community data, admittedly a narrow view given the breadth of work reflecting on 'community effects on fertility', but at the same time a manageable range of material characterized by many common themes and approaches to the data. Findings from the analysis of both fertility preferences and achieved fertility will be considered, as the theoretical propositions concerning the two are roughly similar. While separate considerations of the major proximate determinants of fertility would be highly desirable, only Lesthaeghe *et al* (chapter 3) examine any determinants other than contraception. Tsui comprehensively reviews the findings on contraception in chapter 5.

4.2 STUDIES REVIEWED

Thirteen studies are reviewed (see table 4.1). Apart from a recently completed dissertation at the University of Michigan utilizing community data from Jordan, these comprise the full set of studies of fertility or fertility preferences of which I am aware. As noted above, two studies are based on non-WFS data (Anker 1973 and Hong 1976). Two of the studies reviewed rely on community measures created by aggregation of individual survey data rather than community survey data (Casterline 1982 and Lesthaeghe *et al* chapter 3); aggregation represents a viable alternative source of

Table 4.1 Studies reviewed

Author(s)	Date	Country	Survey data
Anker	1973	Gujarat, India	1970-1
Hong	1976	Kyongsang-nam Do, Korea	1975
Mason and Palan	1978	Peninsular Malaysia	1974
Alauddin	1979	Bangladesh	1975
Nizamuddin	1979	Pakistan	1975
Tsui <i>et al</i>	1981	Bangladesh	1975
		Korea	1974
Casterline	1982	Colombia	1976
		Indonesia	1976
		Mexico	1976
		Peru	1977-8
		Thailand	1975
Casterline and Engracia	1984	Philippines	1978
Chayovan	1982	Thailand	1975
Engracia <i>et al</i>	1984	Philippines	1978
Tienda and Gonzalez	1982	Peru	1977-8
Alloush <i>et al</i>	1983	Syria	1978
Lesthaeghe <i>et al</i> (chapter 3)	1983	Kenya	1977-8

community data for some topics. Several other studies examine a mix of community measures obtained both by aggregation and from community surveys (Hong 1976; Alauddin 1979; Nizamuddin 1979; Chayovan 1982; Tienda and Gonzalez 1982).

Levels of analysis

Alauddin (1979), Nizamuddin (1979), and Chayovan (1982) carry out analysis at both the community and the individual level. A strong case can be made that community effects are most properly examined with the community as the unit of analysis. For example, in addressing the basic question of the relationship between facets of community development and levels of fertility, simply posing the question leads one first to think of comparing communities. This approach is hazardous with WFS data, however, because of the relatively small samples of women per community (the source of fertility measures in the three studies) and the powerful and non-linear relationships between fertility and demographic characteristics such as age, parity, and union duration. These relationships are normally

not properly accounted for by controlling community mean values of the demographic characteristics. Hence findings from community-level analysis are not included in this review, despite the considerable potential of aggregate-level analysis as a complement to individual-level analysis.

Methods of analysis

Confronted with a large set of community variables, many demonstrably highly correlated and thought to measure similar underlying global variables, most analysts construct composite indices as a method of data reduction. (The exceptions are Tsui *et al* 1981, Casterline 1982, Casterline and Engracia 1984, and Lesthaeghe *et al.*) Some authors utilize factor analytic techniques (Alauddin 1979, Nizamuddin 1979, Tienda and Gonzalez 1982), while others construct indices on the basis of *a priori* judgements, sometimes combined with inspection of results for individual components of the indices (Anker 1973, Hong 1976, Mason and Palan 1978, Engracia *et al* 1984, Chayovan 1982, Alloush 1983).

It is clear from reading these works that many

authors have spent long and painful hours attempting to reduce the community data to manageable size. Where the hypotheses of interest contain general concepts better measured by composite indicators, a strong case can be made for their construction. (Suspect measurement of individual items adds incentive.) In reviewing these studies, however, one concludes that this has rarely been the case and that a considerable amount of useful specificity and detail has been lost. A composite index of the accessibility of health services, for example, may conceal institutions which differ widely in types of services offered, cost of services, and place within the national health infrastructure (Mason and Palan 1978). Reduction of development to several indices ignores its multiple aspects and would seem less useful to public policy than examination of effects of identifiable institutions and services. Alloush *et al* (1983) report that in Syria sets of community variables which seemed in advance to lend themselves naturally to reduction into indices in fact showed extremely varying effects on fertility preferences. It will be a theme of this paper that more specificity in conceptualization and analysis would strengthen research with community data. Included in this recommendation is the suggestion that the selection and development of community measures for inclusion in final estimations should result in focused and substantively interpretable measures.

All the studies reviewed are multivariate analyses which rely heavily on formal statistical testing.

Formulation of models

In my judgement the weakest feature of the research to date is the conceptualization of the issues under investigation. (I ignore for the time being the design of instruments and the collection of data, which may represent even more serious liabilities.) Here the infancy of this area of research is most apparent. In many studies a general hypothesis seems to be under investigation: variables obtained from a community survey show effects on fertility, net of individual demographic or socio-economic characteristics. The equations used to test this hypothesis typically contain a large number of community variables (or composite indices) and a standard battery of individual and household characteristics. Lacking in this approach is attention to the following considerations, which I regard as fundamental:

- 1 The community variables of interest are as numerous and diverse as individual and household characteristics, so that a global hypothesis about them is not theoretically sensible, nor is a global conclusion of much use to the field.

- 2 Community measures from WFS surveys are usually highly associated. This occurs for several reasons: several measures may indeed tap the same underlying dimension; measures may share common determinants; the measures may be causally related. Explicit attention must be given to the source of these associations, for example by modelling relationships or selecting amongst redundant measures. Otherwise the analyst risks discounting important variables and causalities due to the non-significance of individual measures in lengthy multivariate equations. (Chayovan (1982), for example, simultaneously tests for effects of 17 community variables.)
- 3 Community characteristics may impinge on individual demographic behaviour indirectly through individual socio-economic characteristics (Casterline 1981) or by modifying individual relationships (Freedman 1974). Neither of these types of effects is expressed through a model of additive individual and community effects. Of the studies reviewed here, Chayovan (1982), Tienda and Gonzalez (1982), and Lesthaeghe *et al* (chapter 3) examine the possibility that community characteristics modify individual relationships (that is, interactions between individual and community measures are tested). Indirect effects have not been modelled, and indeed this will often be difficult to achieve. But it must be agreed that socio-economic characteristics, such as educational attainment and occupation, are not entirely household-produced – opportunity structures play determining roles. And these structures themselves undergo massive changes in response to macro forces operating at very high levels of aggregation. Thus many community effects are expressed through individual and household characteristics. Moreover, because the effects of these individual and household characteristics themselves may be conditioned by community characteristics (education and occupation effects, for example, may be a function of employment opportunities and level of prosperity), the modelling and analysis of the full impact of community factors is intrinsically complex.

It is not difficult to demonstrate the existence of community effects of some sort. The tables of sampling errors in the appendix of WFS *First Country Reports* show that a substantial amount of variation in reproductive behaviour occurs between, rather than within, the sampled communities. (Chayovan (1982) explicitly considers this matter as a preface to her more detailed analysis.) The challenge is accounting for this between-community variation. To date the usual approach has

been to examine between-community variation net of compositional differences in demographic and socio-economic characteristics, and to partial this variation among a large set of variables. In my view a sounder approach is to specify particular effects of community variables which are theoretically plausible and substantively important, and then to proceed to test them with careful regard for the limits of the available community data.

The lack of conceptual definition is a frustrating feature of the research reviewed here. Where a large battery of community variables are simultaneously tested and, in the main, rejected, the reader is left with little sense of what in fact has been rejected, other than 'community variables'. Moreover, one fears that, in view of the three considerations noted above, effects of some interest have not been detected. The lack of conceptual definition is not merely a function of the number of variables considered. For example Lesthaeghe *et al* (chapter 3) confine their attention to one macro characteristic — mean years of schooling — but fail to develop a case for interest in this variable. In the end, a variety of interpretations are assigned (*ex post*) to its effects, depending on the nature of the results. (It is taken as a measure of level of economic development, ethnic heterogeneity, greater social acceptance and discussion of contraception, and, merely, educational heterogeneity. Indeed, the variable probably does capture aspects of many of these. The utility of analysis subject to such diffuse interpretations is questionable.) Tienda and Gonzalez (1982) also focus on mean years of schooling as a community characteristic and go somewhat further in developing a conceptual argument, but the multi-faceted nature of the variable leaves them as well with findings subject to varying interpretations, with diverse implications for theory and public policy.

The remainder of this review is organized in terms of specific hypotheses, in an effort to achieve a more systematic assessment of the findings. In the next section a set of hypotheses which can be examined with WFS data are proposed, and findings reflecting on each are reviewed in turn.

4.3 FINDINGS

Casterline (1981) and Potter (1983) drawing on McNicoll (see, eg, McNicoll 1980), have developed schema for classifying the direct effects on fertility of community and institutional settings which correspond closely:

- 1 Effects on the economic costs and benefits of children.

- 2 Effects on internalized values concerning the family, marriage, and fertility.
- 3 Social and administrative pressures bearing on the reproductive behaviour of individuals and couples.

A wide range of costs and benefits can be subsumed under (1). Category (2) includes normative pressures applied through socialization processes and more deliberate means. The provision of family planning services, perhaps the most researched community activity, falls within (3).

Note that effects (1) are thought to influence *incentives* for large or small families and will only be expressed in realized fertility to the extent these incentives are fully implemented. Effects (2) are, by definition, effects on reproductive attitudes which again need not find expression in levels of fertility. It is thus plausible that community effects will be most directly observed in attitudinal data (Casterline 1981), and for this reason analysis of fertility preferences are included in this review.

WFS community data are inappropriate for the investigation of most of these sets of effects, many of which may not lend themselves to investigation with any community survey data. Indeed, it is impressive how many of the propositions discussed by Potter (1983) demand, most of all, individual and household surveys with different or more detailed items than has been the practice (perhaps supplemented by community measures constructed from household survey data or obtained from community surveys).

For the purposes of this review I consider seven propositions. Some of these are derived from Freedman (1974), who, when advocating a community survey, noted a set of issues which could be addressed with such data. Several are, in some respects, as nebulous as the concepts attacked earlier in the paper, but when considering each one a defence is provided.

Agricultural development

These are a number of reasons why agricultural development might promote fertility decline. The mechanization of agriculture and the introduction of modern agricultural methods eliminates activities children can perform, thereby reducing their labour value. This will especially occur with a departure from familial-based agricultural enterprises. The wage-labour market for children may continue or even expand, but it is assumed that usually this will not compensate the lost potential for child contributions in family enterprises. At the same time, a wage-labour market for women may attract them away from family activities and, with new opportunities for earning,

increase the opportunity costs of childbearing. To the extent agricultural development increases overall prosperity, however, it may act to raise or lower fertility, depending on whether positive or negative income effects dominate.

Four of the studies under review consider measures of agricultural development, but in no instance does a significant relationship with fertility or fertility preferences emerge. Hong (Korea) relates the availability of modern farm implements and machines to children ever born. Nizamuddin (Pakistan) utilizes a measure of the accessibility of agricultural extension agencies in analyses of the desire for another birth and children ever born. Alauddin (Bangladesh) examines a measure of 'modern agricultural practices' (use of chemical fertilizers, new seed, and insecticides), a measure of the extensiveness of irrigation facilities, and the existence of farmers' organizations in an analysis of desired family size. Chayovan (Thailand) constructs an index of agricultural modernization from items on the availability of an irrigation system, the use of fertilizer, and the use of mechanical equipment and relates it to desired family size and length of the open interval. She detects weak effects on the length of open interval which disappear once region of residence is controlled.

Industrial development

The arguments concerning the fertility impact of industrial development resemble those for agricultural development. The move into non-agricultural economic activity is thought to reduce the labour value of children while increasing the cost of child rearing, as investments in schooling are required for success in non-agricultural labour markets. Industrial development may also generate employment opportunities for women. In some societies non-agricultural firms are most likely to hire unmarried women, so that the crucial effect on fertility may be through nuptiality, but this possibility is awkward to examine with WFS data.

There are few results bearing on this proposition. Analyses of indicators of village modernization – such as electricity – are considered in the next section, although they may well be closely linked to non-agricultural development.) Hong (Korea) finds no effect of the proportion in the village working in farm occupations on desired family size. Alauddin (Bangladesh) similarly finds the level of employment of males in agricultural labour unrelated to desired family size, but in rural Bangladesh those not engaged in agricultural labour will for the most part be small craftsmen or men engaged in other village services.

Chayovan (Thailand) finds desired family size related, in the expected direction, to an index of industrial development based on two items: the presence of an industrial enterprise and the existence of land transactions for industrial purposes. Controlling region and ethnicity eliminates this effect, however, and analysis of length of the open interval uncovers no effect of this index.

Village modernization and prosperity

Consideration of more general indicators of village modernization violates my earlier strictures against vague concepts. An exception is made for two reasons. First, most of the works reviewed include such an assessment of effects of global modernization measures. Secondly, the indices falling under the rubric of 'village modernization' are usually constructed from specific items which measure village characteristics largely determined by governmental activities: electricity, in particular, but also piped water, roads, schools, mail service and telephones, to name a few. Many governments assign high priority to these amenities and services and invest substantial funds in their development. The WFS community data enable investigation of whether acquisition of these amenities and services is systematically related to another priority of many governments, reduction of levels of fertility. While the causal relations are not well specified in most of the analyses of this topic, the underlying question is of such major interest and concrete enough in its referents to justify analysis.

Anker (India) provides the first positive evidence: among eleven villages in rural Gujarat, an indicator of development, based on presence of electricity, type of roads and water supply, and the number of college graduates, is strongly related to both desired family size and children ever born. The analysis includes a control on the income of individual households. Engracia *et al* (Philippines) find a negative effect on recent fertility (during the five years preceding the survey) of a similar index, in this case constructed from items on the presence of electricity and the accessibility of a telephone, telegraph, mail service, newspaper, movie house, and secondary school. The effect is net of effects of individual socio-economic characteristics. Electricity is a key item in the index, and for this reason the finding complements those of Herrin (1979) on the impact of rural electrification in one province of Mindanao island in the southern Philippines. An impact of similar magnitude does not emerge in other settings. Hong (Korea) finds no impact of electrification on children ever born; Chayovan (Thailand) finds neither desired family size nor length of the open

interval affected by the presence of electricity in the village; Alloush *et al* (Syria) estimate negligible effects of electricity in the community on desired family size and the desire for another birth. (The latter study, however, finds significant effects of electricity measured at the household level. Most plausible effects should operate principally at the household level, so this finding is not surprising and serves to emphasize that household data on certain amenities and utilities will be more directly pertinent than community data.)

Other authors utilize measures capturing other features of village prosperity. Alauddin (Bangladesh) considers an index based on proportion of households owning homes and owning land; it is not related to desired family size. Chayovan (Thailand) finds an 'index of land availability', constructed from items on the average size of land holdings and the amount of land available in the vicinity, to be an insignificant predictor of desired family size and length of the open birth interval. In contrast, the index of community accessibility developed by Tienda and Gonzalez (Peru) shows an additive effect on recent fertility; the authors do not specify which items comprise the index, but inspection of the Peruvian Community Survey questionnaire suggests that a range of community amenities and services are probably included.

Finally, it may be relevant in this context to mention findings on effects of the mean educational level of the community, as this possibly serves mainly as a non-specific indicator of community development. Alauddin (Bangladesh) finds no effect on desired family size, but Chayovan finds the same relationship to be of some strength in rural Thailand. She also estimates a puzzling *negative* effect of the same measure on length of the open interval. (As noted earlier, Chayovan's equations are extremely large, leaving considerable potential for distorting effects of multicollinearity.) Tienda and Gonzalez (Peru) and Lesthaeghe *et al* (Kenya) focus their analyses on this variable. In Peru recent fertility is negatively related to community educational levels, net of individual educational attainment. In Kenya the outcome is more complex and difficult to summarize. Particularly intriguing is the estimated amplification of the negative effect of individual educational attainment on cumulative fertility with increases in levels of community education.

Educational opportunities

Increased opportunities for schooling of children may encourage family limitation for several reasons. Schooling is widely recognized as a vehicle for social mobility, and hence schooling opportunities have

intrinsic appeal to parents despite the loss of child labour resulting from school attendance. Schooling usually entails financial costs, and thus benefits of children (labour in familial enterprises) are replaced with costs. Schooling may also have complicated ramifications on family relations and the role of children, a theme Caldwell has elaborated in a series of articles over the past eight years (see, eg, Caldwell 1980). It is also possible that schools, along with the various instruments of the mass media, promote with some success a Western ideal of family relations, as Caldwell argues. If so, the presence of schools — school teachers, school materials — in a community may influence adults who themselves are past school age.

Several analysts have examined the relationship between the accessibility of schools and fertility. None find any significant impact of the proximity of schools. Alauddin (Bangladesh), Nizamuddin (Pakistan), Chayovan (Thailand), and Alloush *et al* (Syria) uncover no effects on fertility preferences, while Nizamuddin and Chayovan find no effects on measures of fertility. The intriguing finding is reported by Alauddin, who estimates a significant negative effect on desired family size of the proportion of families having at least one child aged 5 years or older in school. This measure is obtained from the individual interviews conducted in each village. Surely geographical proximity is not the only important aspect of school accessibility. Indeed, on the basis of the Bangladesh community survey data, one would conclude that schooling is readily available: 93 per cent of the 158 villages are said to be located within one mile of a primary school (a figure which seems inflated). Other costs and barriers have a determining influence on the opportunities afforded by the presence of an institution. Arguably the level of school attendance, as indicated by Alauddin's measure, more validly taps the variation in schooling opportunities. Thus the negative relationship with desired family size is very suggestive, although it should be noted that the causality underlying the relationship is not pinned down and one may assume that complicated reciprocal effects amongst a set of factors exist. The finding also illustrates the potential for developing meaningful community measures by aggregation of individual or household survey data.

Health services, public sanitation

Easily accessible health services, like schools, provide opportunities for parents to invest in children of higher quality. In most settings this will require financial investment, and hence a valued change in child rearing increases the cost of children. Freedman (1974)

suggests an effect through reduction in infant and child mortality, which under classical theory should reduce the demand for large numbers of live births. This particular effect of health services and public sanitation would be better tested with direct information on levels of mortality in the community and surrounding vicinity. These proposed effects of accessibility of health institutions only operate, of course, if such institutions provide useful therapy, preventive services, or by educational activities promote better child care.

All WFS community surveys included inquiry about the proximity of health services, from which most authors have derived measures incorporated in their analysis. Mason and Palan (Malaysia) examine an index of medical facilities and find no relationship with children ever born. An index of household water and sanitation performs better, showing a negative effect for Chinese of less than 10 years marital duration, but the same index is positively related to the fertility of Chinese of 10 years or more marital duration and unrelated to the fertility of the major Malay group, so on balance the hypothesized effects are absent. A large set of health and sanitation items are unrelated to desired family size in Bangladesh (Alauddin). The accessibility of neither health nor family planning services influence Chayovan's (Thailand) fertility measure, but there is a small, but still interesting, effect of family planning services on desired family size. One can argue that easier availability of means of family limitation encourages contemplation of smaller family sizes. Tsui *et al* (1981) estimate a negative effect of the availability of family planning services on recent fertility (three years before the survey) in Mexico but no similar effect in Bangladesh or Korea. For a variety of reasons the Mexican finding is difficult to interpret. Finally, Alloush *et al* (Syria) conclude that desired family size and the desire for another birth are not affected by their summary index of the accessibility of health facilities. But they report that certain types of facilities – pharmacies, and maternal and child health centres – show the proposed impact on the two preference measures.

Two authors examine the relationship between community levels of mortality and fertility behaviour. Nizamuddin (Pakistan) demonstrates that mean levels of children ever born rise with levels of community mortality, as estimated from the maternity history data for the surveyed women. There are grounds for suspecting that the relationship is artifactual, however. Fertility preferences are more safely used for this purpose, and he finds that the desire for another birth is not related to the same mortality measure. Similarly, Chayovan (Thailand) finds no relationship between

desired family size and estimated levels of community mortality.

Community isolation

In his development of a rationale for a community survey, Freedman (1974) stressed an hypothesized link between expanding networks of transportation and communication and fertility decline. Essentially his is an argument for the exogenous role of these expanding networks in societal transformation. On this matter Freedman draws heavily on the work of Hawley (1950) and other human ecologists, a tradition largely lost sight of in recent decades in research on social and economic change and fertility in the Third World, although the work of Knodel and his Thai colleagues recalls the same themes (see, eg, Knodel and Debavalya 1978).

The assertion is not that reduction of isolation *per se* promotes fertility decline. Rather, improvement in networks of transportation and communication almost invariably stimulate other changes which undermine the centrality of familial institutions. Access to employment opportunities outside the community, especially in towns and cities, increases. The opportunities for social and economic mobility increase the value of schooling, with the hypothesized fertility impact described above. The reliance on family members for physical security (with greater numbers usually an asset) may diminish with the increased integration of communities into the effective domain of the national government. More dependable access to public agencies may also reduce the dependence on family-based risk-sharing schemes. In sum, a host of changes may be promoted by, or at the least may depend on, the expansion of transportation and communication networks and the consequent integration of previously remote communities into a broader regional or national context. Obviously many factors are involved: by the standards established earlier in the paper the conceptual argument here is very imprecise. Specificity is provided, however, not by the suggested causal relations but rather by the variables treated as exogenous, namely features of the transportation and communication infrastructure. Improved roads, the building of bridges, the diffusion of motor vehicles are relatively specific changes in community context, which may also be the subject of governmental action. Thus while community isolation seems a non-informative construct, it can be viewed as a parsimonious way of summarizing a constellation of factors, and it bears directly on public policy.

A second, and somewhat distinguishable, means by which the reduction of isolation promotes fertility

change is more simply described. Improved communication eases the diffusion of new ideas and the exposure to alternative (and Western) images of family life. Receptivity to these ideas and images, once exposed, also requires explanation, but increase in exposure itself may be a crucial catalyst.

This is a proposition which the WFS community data are designed to test, albeit with cruder indices than one might wish. Most authors have utilized measures which in some manner reflect levels of community isolation. Anker (India) finds that both desired family size and children ever born are related to the extent of 'urban contact'. Mason and Palan (Malaysia) report that measures of community isolation performed well in exploratory work but then were dropped from the final analysis. No reason is given; one can suppose the measures were perceived as too vague. Alauddin (Bangladesh) and Nizamuddin (Pakistan) find no effects of any measures of accessibility to transport or communication (including, for Alauddin, the availability of newspapers and radios in the village) on either desired family size or fertility. Chayovan (Thailand) estimates no effect of distance to the district or provincial centre on desired family size or length of the open birth interval, and only a weak relationship between the availability of newspapers and television and desired family size. In contrast, Tienda and Gonzalez's (Peru) 'accessibility index' shows an additive effect on recent fertility, and Alloush *et al* (Syria) uncover large effects of a summary media index on fertility preferences.

The results are clearly mixed. It appears that the expected patterns emerge in those analyses which utilize a smaller block of community variables. I suspect this is because so many community changes are linked to the increase in community accessibility. Inclusion in the estimated equations of measures of factors which should be modelled as intermediate between extent of isolation and fertility is bound to attenuate the estimated effect of isolation and, in fact, conceal its importance. This is an instance where it is essential to develop models of relationships among the community variables. Alternatively, to make the analysis manageable, it may be simplified so that the consideration of measures of community isolation is more concentrated.

In an unpublished work, Community Isolation and Fertility in the Rural Philippines, Casterline and Engracia (Philippines) examine the relationship between the travel time from the barangay to the municipality centre (where most marketing, commercial, and political activities are based) and fertility preferences. The gross effect is first examined and found to be substantial. Controls for individual demo-

graphic characteristics hardly alter the effect, nor, surprisingly, do controls for individual socio-economic characteristics such as the husband's occupation and the respondent's years of schooling. In fact, the mean adjusted preferences range more widely across categories of time to the municipality centre than across categories of years of schooling (and educational levels are high in the rural Philippines relative to most other Third World countries). Controls for other community characteristics, such as the accessibility of health facilities, schools, or government offices, largely eliminates the effect of time to the municipality centre, but some of these other institutions are, demonstrably, concentrated in municipality centres and thus inclusion of these other variables can be viewed as redundant. The analysis on balance confirms expected effects of community accessibility in a country where, due to topography, rural isolation is a relevant concept.

Social pressures

Potter (1983) uses the term 'social pressure' to refer to a variety of means by which individual reproductive decisions may be influenced by group actions. Potter seems to have in mind deliberate actions, such as employed at the local level in China in recent years. In a similar vein, in several papers McNicoll argues for the potential for exercise of population policy at the local level but stresses that the potential is limited by the effectiveness of local political leadership and the coherence of essential social and political institutions at the local level. (See, eg, McNicoll 1980.) Lesthaeghe's (1980) arguments about the relationship of authority structures (of lineage groups or local communities) to the process of demographic decision-making are also relevant.

WFS community data are of little assistance in addressing these issues. The information gathered about administrative and governmental structures refers only to the formal existence of institutions and groups and tells almost nothing about their manner of working. This may be an instance, in any case, where the important differences are cross-national, not among rural communities within a country. Many WFS surveys included items on the existence of local associations or co-operatives, but a review of the research reveals little use of them in final analyses. Hong (Korea) tests for effects on children ever born of a measure she terms 'village rules' — whether the village has formal or informal rules to control village affairs — and of the proportion of villagers belonging to associations or clubs. The former shows a significant positive effect and the latter a negative effect.

There are other findings suggestive of the role of

social pressures on reproductive behaviour, but here, it must be conceded, one enters an area of severe conceptual ambiguity. One line of reasoning hypothesizes an influence of community heterogeneity, as measured by variables such as ethnicity and educational attainment. In homogeneous communities the tolerance of different behaviour – non-traditional fertility behaviour, for example – is lower and the enforcement of normatively prescribed behaviour is stronger. With heterogeneity comes what Lesthaeghe (1980) terms 'diversification of the moral code'. When societies are undergoing modernization and Westernization, community diversity on variables such as education and employment activity provides those with traditional attitudes and behaviour with role models more tangible than those provided through the mass media.

There is evidence relevant to these propositions. Mason and Palan (Malaysia) report no effect of ethnic composition of the community once other variables are controlled. Lesthaeghe *et al*'s (Kenya) findings are interesting and complex. Contextual effects of education on both breastfeeding and age at marriage are enhanced by cultural (ethnic) heterogeneity and the presence of immigrants in the community and suppressed by cultural homogeneity. The result is interpreted as reflecting tolerance of a wider range of behaviours in heterogeneous communities. (It should be noted that no direct measure of ethnic heterogeneity is included in the analysis, however.)

Several other bits of analysis more directly concern normative pressures generated by the prevalence of attitudes and behaviour in the community. Chayovan (Thailand) estimates a strong negative effect of mean desired family size of the village on the length of the open interval. Casterline (1982) examines the relationship between individual responses to an attitudinal item (the intention to use contraception) and community levels of a behavioural item (contraceptive use). The argument is that adoption of fertility control by some community members reduces the social costs (or, put differently, alters the normative context) for other community members. This line of reasoning is consistent with diffusion of innovation models in which allowance is made for the role of normative structures. These have been most fully developed with respect to fertility change by Crook (1978) and Retherford (1983). The findings for five countries are not fully consistent with the hypothesis: Thailand and especially Indonesia showed expected results, but no effects are apparent in Colombia, Mexico, and Peru. The mixed findings are subject to several competing interpretations. The author speculates that societal differences in the level of social integration at the local community level may be the key.

Direct effects on fertility preferences and reproductive behaviour of ethnicity and region of residence have been observed in a number of WFS surveys (Cleland *et al* 1979; Pullum *et al* 1984), and it is plausible that these reflect the influence of normative structures. But direct evidence supporting this is not provided and, in fact, Cleland *et al* (1979) avoid assigning a definite interpretation to the Thai regional patterns.

4.4 CONCLUSION

Totalling up the statistically significant findings leaves one almost empty-handed. Measures of community development – agricultural modernization, non-agricultural economic activities, village modernization as measured by the presence of utilities and amenities – rarely show systematic relationships with fertility. Exceptions are, in several countries, indices in which community electrification is a major component, and community levels of education, if this is taken as a general measure of level of community development. That is, relatively specific and relatively diffuse measures show effects, but for the large set of indices falling somewhere in between no net effects on fertility are estimated. The accessibility of schools and health services similarly appear unrelated to fertility, apart from Alauddin's (Bangladesh) finding of a detectable impact of levels of school attendance. Community accessibility, as measured in a variety of ways, is an insignificant predictor in most studies, but there is evidence that in some countries effects of substantial size do emerge under certain analytical approaches. Findings suggestive of the importance of social pressures on reproductive decisions have also emerged. The modelling and empirical investigation of the nature of these effects is clearly still in a formative stage. (van den Eeden and Hüttner (1982) identify types of social effects which might be considered.) Our understanding of the social processes underlying fertility change is as yet shallow, but this is an area of research which holds some promise.

I have noted above my misgivings about the design of much of the research reviewed, and this makes me hesitant to draw firm conclusions. Accentuating these misgivings are doubts about the design and conduct of many of the community surveys themselves. Nevertheless, one cannot help but think that were community features – such as clinics, schools, availability of electricity and piped water, or paved roads – influencing reproductive behaviour through some means, this fact would be more apparent in the results. Only a few authors uncover effects of any magnitude. This is an

outcome with important implications and one which was not, I think it is accurate to say, anticipated in advance by all parties: namely, these particular aspects of village development — highly visible and the focus of substantial governmental activity — are unrelated to fertility in most settings. Possibly significant but more complex effects of these variables exist; if so, the task now is to describe these effects and develop ways of testing for them with empirical data.

One is left with an impression that some of the most straightforward items in the community questionnaires — such as distance to market and governmental centres and the presence of electricity — proved to be of most utility. The questionnaires for some of the community surveys under consideration here were lengthy and detailed (Bangladesh, Malaysia, Thailand). Assessment of the value of the more extensive inquiry is in order: Were the questionnaires badly designed? Was the data collection badly managed? Are the factors considered unrelated to reproductive behaviour, contrary to a substantial body of recent literature? Or is it not feasible to measure them satisfactorily in a one-visit community survey? Are the variables better approached through inquiry about household and individual behaviour, in household and individual surveys? These questions are not readily answered on the basis of our experience to date.

I wish to end on a different note, speculating about the value of community survey data in cross-national research. Contact with community survey data from several countries has left some impressions of interesting national differences in the extent to which various community characteristics are associated. In Bangladesh and Egypt, for example, the associations between the accessibility of schools and health services and economic indicators are often rather weak (A. Al-Kabir and I. Eid, personal communication). This is in striking contrast to Ecuador and Peru, where the associations between the accessibility of pairs of community amenities are almost always extremely large (E. Borja and J. Bernedo, personal communication). (The Philippines seems to fall somewhere in between.) This corresponds with differences in the intensity of institutionalized family planning activities: in general, these activities have been weaker in Latin America. It will be interesting to compare across countries associations between individual socio-economic characteristics, such as educational attainment and occupational status, and measures of the accessibility of community amenities and services.

The impression I have is of major national differences in the extent to which indicators of community development and of the provision of modern services are aligned on one or multiple dimensions. In the two

South American societies, it appears that variation in these indicators occurs along a nearly one-dimensional continuum, whereas in Bangladesh and Egypt the data suggest a more complex matrix of types of communities. If correct, this fits with national patterns of fertility differentials: the Latin American countries are distinguished, from a cross-national perspective, by sharp and consistent fertility differentials by type of place of residence, level of educational attainment, and occupation (Alam and Casterline 1984). It may be that in these societies, as compared to some parts of Asia, lower socio-economic status or location in the traditional sector carries with it more severe inaccessibility to those services which act counter to the high fertility associated with these same positions. This argument implies that our understanding of national differences in fertility patterns could be enhanced by better description of differences in the infrastructure of social services and other institutional activities which influence fertility.

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5 Community Effects on Contraceptive Use

Amy Ong Tsui

5.1 BACKGROUND

Consider the following social facts: individuals are members of families; families reside in communities; communities comprise parts of larger regional units; regions make up the nation state; nation states form the sovereign body of the world. A relevant theoretical question is then: Do corporate institutions affect individual actions, or does human purpose transcend collective demands when sufficiently motivated? Pertinent to this issue is another question: What is the appropriate social unit for the study of social behaviour? Does the decision to act rest primarily in the individual, in his social group, in the national polity, or in what relative combination of these? When it rests in anything beyond the individual, we are considering multiple levels of causation as they stem from the individual and corporate units involved. There is a social demographic perspective emerging, the origins of which can be traced to human ecology theory, which posits a multi-level context for individual action.

At the essence of understanding the nature and extent of macro- and micro-levels of influences on individual behaviour is the acceptance and identification of the various levels of social action that constrain and enhance what a person does. The atomistic view, on the one hand, in a longstanding dialogue on this area argues for individual determinism, ie that the individual exercises full rights over his activities with minimal responsibilities accorded to actions by larger collectives. The holistic view, on the other hand, adopts a stance that sees the individual in constant interaction with and subject to the forces of higher institutions. It has been intimated in the literature on this debate (van den Eeden and Hüttner 1982) that the spectrum of dispositions involved here parallels the rationales for social science disciplines, particularly where the atomistic view represents psychology, and the holistic sociology.

Compared to the mainstream of empirical work on multi-level effects that has dwelled upon educational

achievement given school characteristics, organizational effectiveness given market environments, or occupational mobility given inequality structures, contraceptive practice would seem rather insignificant to merit any collective attention and interest in discriminating between individual and aggregate-level influences. However, if one considers the sources of action which have conspired to influence as personal a behaviour as birth control, one would not be surprised at all. Indeed, one would have assumed that the holistic view dominated the justification of the various macro inputs leading to an increase in individual contraceptive practice in the Third World. The sociological perspective has also been explicit in the design and implementation of the community module (Freedman 1974) for the World Fertility Survey. Most of the research reviewed in this paper is based on a linkage of the community module to individual data. These studies have been conducted even in the midst of a strident debate within sociology over the measurement and significance of aggregate-level effects (cf Hauser 1970; Barton 1970; Farkas 1974; Boudon 1973; Hauser 1976).

In this study contraceptive practice is the focus of a discussion of aggregate-level influences. The inherent technical problems of measurement and model specification are also highlighted as they impinge on the interpretation of the findings. Contraceptive practice will here refer to the set of behaviours leading to voluntary fertility regulation, including the perception of contraceptive sources and knowledge, ever and current use of contraception.

The importance of evaluating community effects on contraceptive behaviour should be evident. At least two recent and specific policy areas have linked their relevance to the decision-making capacities of social groups. The first is the strategy of community development, a direct product of efforts at population redistribution and aimed at improving economic prospects in rural areas. The second is the expansion of contraceptive service availability through community-

Table 5.1 Per cent of ever-married rural women aged 15–49 who know of, ever used and currently use any contraception in selected WFS countries

Country	Per cent knowing	Per cent ever using	Per cent currently using
Bangladesh	81	12	6
Indonesia	74	30	22
Korea, Republic of	96	54	29
Malaysia	89	41	26
Pakistan	73 ^a	6	3
Philippines	93	52	29
Thailand	96	43	29
Jordan	95	21	8
Mexico	71	24	13
Peru	61	20	10

^aPer cent of currently married women knowing efficient methods.

Sources: For knowledge and ever use, tables 4.2.2 and 4.3.2 of *First Country Reports*; for current use, Lightbourne (1980)

based distribution programmes, again targeted at the collective level to make accessible the means for behavioural change. The findings from existing research will justify the confidence felt with regard to the impact of such programmes.

5.2 WFS COMMUNITY DATA

Some preliminaries about community survey data and the available studies are in order before reviewing specific findings and their implications. There is no doubt that the impetus to such research is embodied in *WFS Occasional Papers* no 8 (Freedman 1974) and that the attempts to measure community effects on individual contraceptive behaviour will be an important contribution to the area of multi-level analysis.¹ By this paper's assessment, 17 countries participating in the WFS programme² have conducted a community survey using an instrument similar to that proposed by Freedman. At least two more have independently collected community information that can be matched to the individual respondent's survey record.³ Five of the 17 datasets are now being prepared for analysis, and almost all are accessed only with great difficulty and persistence, unless by pre-arrangement. Eight have not been available for study at the time of writing; thus comparative analyses for contraceptive use are

few. Five PhD dissertations have appeared, not surprisingly at the University of Michigan, on five of the nine remaining countries.

The data are generally specific to rural areas, which limits the amount of variation to be found in such developmental indicators as availability of electricity or telephones at the community level, as well as in modernizing behaviours at the micro-level, eg educational attainment and industrial occupations. This constraint may be one major reason for the weak or moderate impact observed in most studies of community factors on contraceptive behaviour.

The homogeneity in composition is paralleled by homogeneity in contraceptive behaviour. Table 5.1 shows the prevalence of knowledge, ever and current use of any contraception by ever-married rural women in the ten countries with available community analyses.⁴ While awareness of contraception is high among rural respondents, subsequent adoption experience is much less prevalent. In four countries, the ever-use level is about one-half of the awareness level while in the remaining six, it is about one-fourth as great. Current use is between 25 to 30 per cent in four countries for the eligible, although not necessarily exposed, women and virtually negligible in the others. Consequently there is an inherent limit to the explanation possible in individual contraceptive behaviour by micro-level let alone macro-level factors. Of the three behaviours, variation in ever use is the most promising for analysis although current use in Malaysia, Thailand, Korea and the Philippines is and has been worth investigating. Several researchers have

¹ It appears that most of such work has stumbled across the area of multi-level analysis and that reciprocal recognition is yet forthcoming.

² Thailand, Malaysia, Korea, Philippines, Bangladesh, Pakistan, Jordan, Mexico, Peru, Syria, Egypt, Cameroon, Ivory Coast, Ecuador, North Sudan, Yemen, and Nigeria.

³ Indonesia and Kenya.

⁴ No Peruvian community study of contraceptive use was found.

qualified contraceptive knowledge and looked only at awareness of modern or efficient methods in seeking community effects.

Interest in the area of multi-level causation is often traced to the beginnings of contextual and ecological correlation analysis. Relational models for individual and group properties led to a classic typology developed by Lazarsfeld and Menzel (1961) from which particular ones (global, structural, and contextual) have been operationalized in the studies reviewed here. The conceptual, methodological and survey operations developments over the years have enabled empirical study of contraceptive use. The central question of whether there are any community effects on individual fertility regulation has been addressed in a number of studies, using the relational models, but the answer has not been consistently the same.

5.3 FINDINGS

Sixteen studies form the basis of this review (see appendix A). Four are not of the WFS mode. Most are individual-level analyses with supplementing community-level variables. The majority of these studies are either unpublished theses or publications of local research institutions and therefore difficult to access. It was originally intended that only studies merging community and individual survey data would be reviewed. However, several papers (eg Casterline 1982 and Jones 1984) involve subsets of possible combinations of individual, grouped and community-level variables and adopt conventional models of multi-level analysis. Therefore these are included. Broadly speaking then the findings of community effects are discussed here.

A model that specifies the expected nature of multi-level effects is shown in figure 5.1. It follows that the level of community development and the availability of contraceptive services in the community should be positively associated with individual contraceptive use. It is widely accepted that the structural environment of the community will both generally and specifically be supportive of birth control behaviour by women of childbearing age. The collective use of contraception also can affect individual use by providing a conducive normative context for innovation (Casterline 1982). In addition, Freedman (1974: 5) has stated that, 'Almost every ecological fact has ... a psychological perceptual analogue'. Thus the objective presence of certain community facilities are known to be differentially perceived and reported by individuals depending on their interest in such. It is desirable, where possible, to maintain separate measurement of community and

individual access to specific services and facilities. This implies the modelling of effects at two levels. It should be noted that the ability to test such a model for contraceptive use requires a WFS survey which included both the family planning and community modules; and as it stands, only a limited number of surveys enjoy this feature.

The specific contraceptive behaviours which have been analysed to date are knowledge of, ever, current and future use of contraception.⁵ In addition several studies have examined knowledge of a contraceptive source and use of that source.

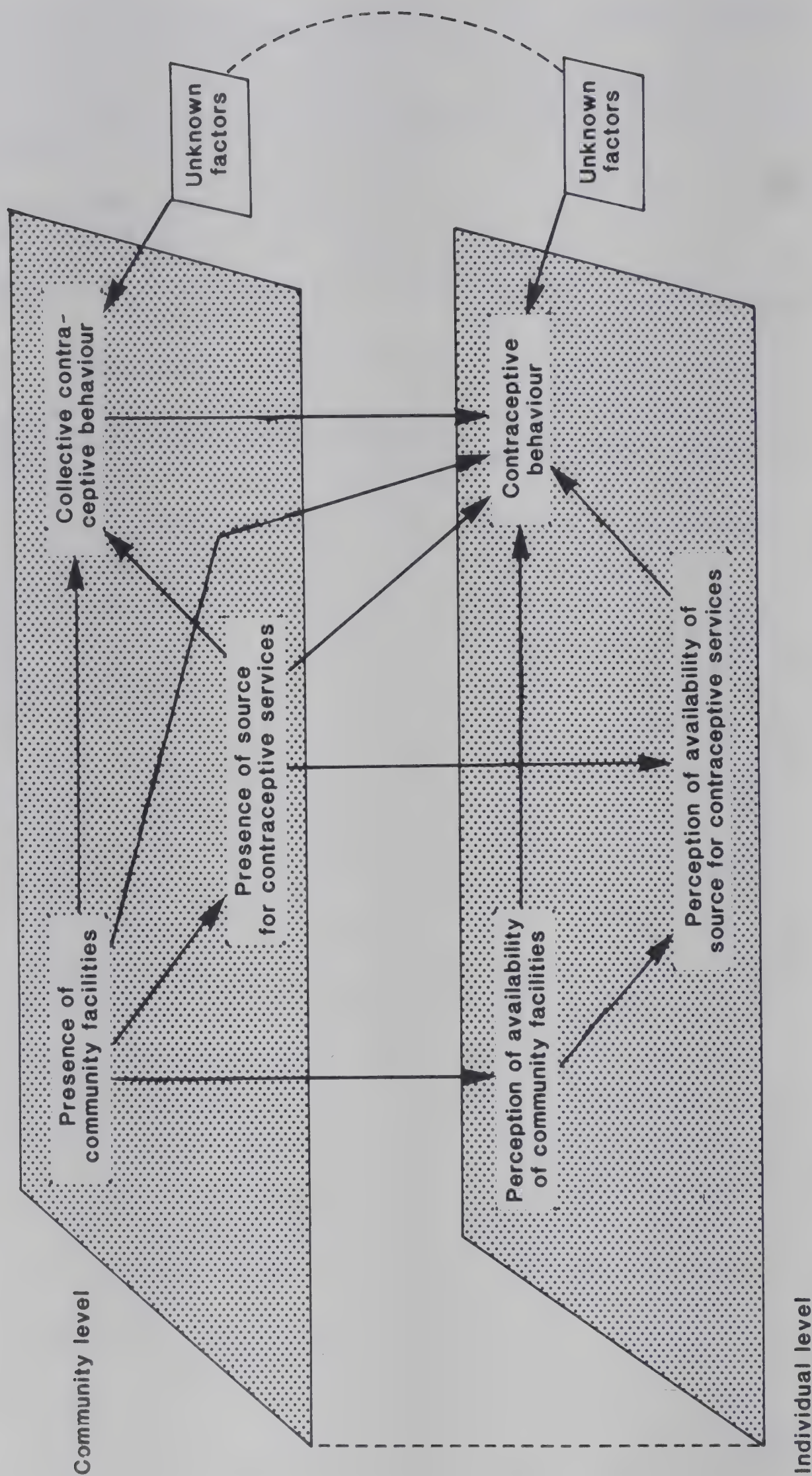
Knowledge of contraception

In Alauddin's (1979a and 1979b) study of 160 rural Bangladeshi villages, he finds that if the village-level aspirations for educating children are high and access to and availability of such facilities as water transportation, sanitation facilities, schools and youth organizations are good, knowledge of clinical contraceptive methods is correspondingly high. In contrast, such community factors as proportion employed in agriculture and access to the *thana's* health and family planning services, plus mean educational aspirations, increase knowledge of non-clinical methods.

Nizamuddin's (1979) study of 193 rural communities in Pakistan finds an anomalous negative effect of access to educational facilities on contraceptive knowledge and a positive effect from access to agricultural extension facilities. These two significant determinants follow the stronger effects of family planning programme exposure (based on fieldworker contact and knowledge of available sources), husband's occupation, and wife's work status. Direct programme exposure appears as an important separate influence while the other variables are proxies for community modernization.

Palan (1979) reports on a study with William Mason (1978) involving 3800 ever-married women in 1500 rural communities in Malaysia. Over 100 village characteristics are examined and those salient distilled into two indices that measure access to health and family planning services (MEDIK) and to public facilities (WORKS) such as water supply and garbage collection. Both show largely weak and insignificant effects on knowledge as well as the other contraceptive behaviours examined. Nizamuddin also performs a multi-level analysis of community effects on individual knowledge of efficient methods to find significant positive influences from access to agricultural exten-

⁵Community effects on unmet need, ie non-use in spite of demand, are also discussed with findings on current use.



NOTE: Distance between levels (dashed line) of unknown magnitude and to be further subjected to theoretical and empirical modelling of behavioural linkages.

Figure 5.1 Schema for multi-level effects of community and individual factors on contraceptive behaviour

sion, family planning, transportation, education and communication facilities. However, the predominant influence comes from individual exposure to the family planning programme.

From these studies, it appears that there are significant community effects on contraceptive knowledge when analysed for Bangladesh and Pakistan at the community level. Their influence on individual knowledge is found in Pakistan but to a lesser extent in Malaysia. In terms of content, variables measuring agricultural modernization seem to improve knowledge in Bangladesh and Pakistan, but their impact relative to other development indicators can not be generalized because of the different study designs. One also finds access to programme facilities figuring importantly in the improvement of efficient contraceptive knowledge in Pakistan and Malaysia and of non-clinical methods in Bangladesh.

Ever use of contraception

Perhaps the first multi-level study of contraceptive use was by Anker in his 1973 dissertation (later published in 1982) involving 467 couples living in 11 rural villages in Gujarat, India. These villages were differentially composed of members of two castes, and the least developed villages were occupied by only the lower caste. Ever use of family planning was separately examined for the two castes against a host of individual variables measuring different values of children, socio-economic status and demographic background. In a Multiple Classification Analysis (MCA), the added explanation of variation in ever use provided by an index measuring village level of development was significant and substantial for the lower caste. No change in explanation was found for the upper caste.

Another study, not using WFS data but perhaps the most elaborate of all multi-level analyses on contraceptive use, is that by Hong (1979) and is based on surveying 2557 ever-married women 15–49 years old in 53 rural villages in Kyongsang Nam Do, Korea. In addition to fertility behaviours, Hong performs various levels of analyses of ever use of family planning – community, aggregate, individual, and combinations of these levels. To measure community development she selects nine variables such as farm technology type, availability of electricity, village type, and New Village Movement programme rank. The significant determinants of community-level use of contraception are the presence of village rules (for controlling village affairs), New Village Movement rank, village type (whether clan dominated) and economic rank (another development index).

Analysis of sixteen aggregate variables, including

mean number of sons, family planning sources, age and per cent in-migration, reveal different determinants of ever use. The average number of sons and sources for family planning are significantly and positively related to ever use. Similarly if only individual variables are considered, of which there are 13, then the number of sons and contact with family planning workers figure significantly.

The full multi-level model of individual, grouped, and community effects on ever use finds significance for the per cent of membership holders (a variable measuring participation in secondary associations) but stronger effects from the number of living sons and family planning programme contact (three variables on visits, knowledge of sources, and number of sources used). In other words, there was very little community effect on individual ever use.

Nizamuddin (1979) looks at ever use at the village level to find that the only significant community effect comes from access to educational facilities which again is inexplicably negative. More influential are wife's education, family planning programme exposure and ideal family size (all mean values). Alauddin's study of individual contraceptive behaviours (1979b) finds among six significant predictors of ever use by Bangladeshi women, two at the community level – the extent of family planning worker visits to the village and access to roads.

Additional evidence of community structural effects comes from Chayovan (1982), who like Hong finds these effects provide more explanation of individual current use than ever use. A multivariate analysis of individual ever use done first with community factors shows significant effects from cultural and socio-economic development indicators and little from family planning inputs. When individual characteristics are controlled, some community variables diminish in importance. Those remaining are community norms for family size, travel time to district centre, availability of mass media, and the average number of health stations.

Study design differences here too restrict much generalization about the findings. It is particularly difficult to identify which community institutions are salient to the contraceptive innovation process. However, the task may be unnecessary given the small, if not negligible, effects that have emerged.

Current use of contraception

Ten studies reviewed have examined community factors that may affect current contraceptive use. Two Korean studies (Lee *et al* 1978 and Hong 1979) both find minimal community impact. Using a subsample of

the 1974 Korean Fertility Survey, ie 776 currently married fecund and non-pregnant women in 60 rural communities, Lee *et al* perform a multi-level analysis with 36 individual, aggregate, and community measures. In a stepwise multiple regression, four community variables — distance to government office, village population, proportion owning televisions, and mother's club activity rank — enter in sixth through ninth place but overall the ten community variables explain only 3.7 out of the 26.8 per cent of the variance explained for ever use.

Hong's community-level analysis of current use locates among the nine variables considered significant effects of the presence of village rules and the degree of centrality, ie distance of schools, post office, bus road, *myun* office, and the like. With the 16 aggregated indicators added, the average number of family planning information sources emerges as a significant predictor also. When all 36 measures are included in a multi-level analysis of current use, more community effects appear than was the case for ever use. Village ceremony, per cent in-migration, degree of centrality, and village rules become significant; but still the number of sons and programme exposure variables predominate. Of the 14.6 per cent of variance in current use explained, both community and aggregate variables accounted for only 1.5 per cent and most of this was due to the aggregate measures.

Similarly Palan (1979) reports largely weak and insignificant effects from the two community indices, MEDIK and WORKS, in multi-level analyses of current use of efficient methods. There are ethnic group and marriage duration specific influences, however. For women married ten or more years, MEDIK increases contraceptive use for Malay women while WORKS increases such for Chinese and a residual group. WORKS, however, significantly decreases use among Chinese women married less than ten years.

In a multi-variate analysis of current use with macro-level variables only, Chayovan (1982) finds the same factors that were significant for individual use remain so for individual current use. Two other variables additionally appear — availability of electricity and level of agricultural modernization. When micro-level variables are included, the model performs less well for current use than for ever use, a finding contrary to that of Hong. The same village factors significant for ever use in the multi-level model retain their predictive value for current use. Chayovan additionally identifies regional and language characteristics that influence current use.

A later study by Entwisle *et al* (1982) of rural women sampled for the 1981 Thailand Contraceptive Prevalence Survey contrasts the effects of three vari-

ables (contraceptive availability, desire for more children, and education) on current use of efficient methods, controlling for a fourth (age). With the benefit of actual measured distance to three family planning service outlets (hospitals, village health centres and district health centres) but without the benefit of many other macro and micro-level variables, the authors find important effects from objective contraceptive availability on current use. Its interactions with education and desire for future births across broad age groups are also considered profitably.

Freedman *et al* (1981) use rural village data assembled following the Indonesian Fertility Survey to find no consistent improvement in current use of modern contraception with community modernization. Such characteristics as access to education, health and commerce facilities, availability of television and electricity, and distance to nearest city in the district do not differentiate individual current use in ways predicted by development hypotheses. Contraceptive availability is reported in 94 per cent of the villages and therefore not examined. The authors, noting that poverty and the absence of modern facilities may not be a negative factor for modern birth control use, suggest that the persuasive programme tactics in Indonesia targeted specifically at the poor may account for the unusual results.

Thus far most studies cited have implicitly tested the impact of community development on current use through a series of variables. Two other studies (Engracia *et al* 1984 and Tsui *et al* 1981) create a summary measure of community development and compare its effect on individual current use against that of community contraceptive availability. These constructed indices are based on the availability of various public facilities (see appendix A for details). The Tsui *et al* study examines the relationship for all of Mexico and rural Bangladesh and Korea, the Engracia *et al* study for rural Philippines. The two obtain somewhat different findings. Engracia *et al* find community development to be highly significant in determining the likelihood of current use, holding a woman's age and community availability constant. Having least contraceptive access is the only category of availability that significantly affects the probability of use. Tsui *et al* find significant effects of availability and development, net of other variables, only in Mexico where both urban and rural women are included. However, their model includes woman's education rather than age as a third determinant and holds constant marital duration and parity. Consequently, the different assessments of the role of community development may involve its filtered presence in a woman's educational attainment in the Tsui *et al* study. It is noteworthy that

these two studies maintain community availability of contraception as a separate determinant of use, whereas in some of the other studies it is combined into measures of programme contact.

It is of intrinsic interest to compare the objective and subjective reporting of contraceptive availability and their joint effect on current use. This comparison has been done by Casterline and Engracia (1984) for rural Philippines and by Tsui (1982) for Mexico and rural Korea, and has been proposed for rural Malaysia by Takeshita (1979). Results for current use patterns are only found in the Tsui study. Here the community and individually perceived levels of contraceptive availability are each categorized as being none, low, moderate or high and their joint association used to identify a summary measure where the objective and subjective levels are both low, moderate or high, or where one markedly exceeds the other. In both Mexico and rural Korea, this joint availability measure significantly differentiates current use as well as current use of an effective method and unmet need (non-use by women desiring no more children). It is additionally significant for discontinued use in Mexico. For example, in Mexico the per cent of currently once-married women 20–44 years old who are now using contraception increases from 13 to 69 per cent when joint availability moves from low to high levels. However, if the perceived availability substantially exceeds the objective measure, the per cent currently using is 56 as compared to 37 when objective exceeds perceived. The effect of this joint measure of availability, net of the woman's education, desire for more children, husband's occupation and urban–rural residence, remains significant for current use and unmet need in both places.

Motivation clearly plays an important part in innovation. Knodel, Debavalya and Kamnuansilpa's (1980) examination of community contraceptive availability in Thailand suggests the same. Motivation may be responsible for the large percentages of rural Thai women currently contracepting even though services are not immediately available in their village or in the district.

In all, of the ten studies, two (Engracia *et al* 1984 and Chayovan 1982) find either a strong or moderate effect of community development on individual current use while most of the others locate disparate and weak effects. The inconsistency may be due to study design. The specific community effect of access to contraceptive services is found to be of influence in Tsui *et al* (1981) and Entwisle *et al* (1982) and partially in Engracia *et al* (1984); it is indirectly observed in Nizamuddin (1979), Hong (1979) and Lee *et al*

(1978) through exposure to the family planning programme.

Intention for future use

In a comparative study of currently married fecund women in Colombia, Thailand, Indonesia, Mexico, Peru and Thailand, Casterline (1982) uses as a community factor the proportion who have ever used efficient contraception to estimate its effect on future intention to use by never users. This aggregation of individual behaviour is tried at various levels, eg selected sampling stages and geographic divisions, with the hypothesis that a supportive social climate for innovation can be estimated accordingly. The impact of aggregate use on individual intention for future use is measured net of such factors as length of the open birth interval, education of wife and husband, and husband's employment in agriculture. Mixed results are obtained from this contextual analysis, where the Asian, but not the Latin American countries, show the expected increases in future intention to use as the normative climate becomes increasingly favourable. Although data problems affecting aggregation levels may be responsible for the equivocal results, the overall marginal community effect is not out of line with the findings of other studies that focus on different contraceptive behaviours. This study is unique, however, in its explicit modelling of the sociological mechanisms behind the innovation process.

Knowledge and use of sources for contraception

Three studies look specifically at community determinants of individual knowledge about contraceptive sources (Palan 1979, Casterline and Engracia 1984, and Jones 1984). The three adopt rather different approaches which restrict comparisons. Basically Palan reports that the community-level indices described earlier do increase knowledge of sources but relative to individual factors perform rather weakly. The part of Jones' study relevant here is done with aggregate units (the primary sampling units) for Ghana, Paraguay, Philippines, Sudan and Venezuela, using responses by currently married women under age 45. It is also restricted to localities where respondents knew of sources, introducing selectivity problems for cross-national comparisons. Her analysis, which centres primarily on the reported availability of four methods, finds significant and direct effects from travel time in order to gain access to the pill, IUD, condom and female sterilization in Paraguay, the Philippines and Venezuela, and for the pill in Sudan. Other vari-

ables, eg mean education and region, emerge as important and may in some sense also be indicative of degree of access to methods. Insofar as its findings are concerned, this study is important for its identification of the link between contraceptive availability and use, ie through knowledge of sources.

A third view on community effects on knowledge of a source carries the comparison between objectively reported and individually perceived availability to interesting detail. Casterline and Engracia cross-tabulate these two levels of measurement and find that two particular sources of family planning services in the Philippines – the barangay supply point (BSP) and the full-time outreach workers (FTOW) – are rarely mentioned by individual respondents as the nearest source. The community survey shows 85 per cent of the nearest sources to be the FTOWs or BSPs. Neither current contraceptive use status or desire for additional births appear to influence individual reporting, and depending upon which level of data is used to access contraceptive availability, very different profiles result.

What these three studies have in common, which can be generalized to the others as well, is the very different make-up of contraceptive use dynamics at the collective as opposed to the individual level. Where community effects are weak or inconsistent with expectations, possibly other unobserved factors, of either collective or individual type or both, are influencing responses. Jones' study continued to model the availability–knowledge relationship at the individual level and found no clear effects of travel time. The paired measurements of a social attribute at the community and individual levels provide us with a most intriguing theoretical and methodological question to answer. The inherent issues are raised in the following section as they affect the understanding of these research results.

5.4 ISSUES IN INTERPRETATION

Table 5.2 gives the extent of the community effects on contraceptive use observed in these studies.

Table 5.2 Extent of community effect on contraceptive behaviour in various studies

Study	Level of analysis ^a	Extent of community effects
Anker and Anker (1982)	I + C	Moderate, only for one of two castes studied
Lee <i>et al</i> (1978)	I + A + C	Weak
Nizamuddin (1979)	A + C	Moderate
	I + C	Weak
Alauddin (1979a and b)	C	Moderate to strong
	I + C	Weak to moderate
Hong (1979)	C, A, A + C	Moderate to strong
	I + C, I + A, or I + A + C	Weak
Palan (1979)	I + C	Weak
Tsui <i>et al</i> (1981)	I + C	Weak for development, strong for availability
Tsui (1982)	I + C	Moderate to strong
Casterline (1982)	I + A	Weak to moderate
Casterline and Engracia (1984)	I + C	Community versus individual measures of availability differ
Jones (1984)	A	Strong
Freedman <i>et al</i> (1981)	I + C	Weak
Engracia <i>et al</i> (1984)	I + C	Strong for development, moderate for availability
Knodel <i>et al</i> (1980)	I	Cross-community comparisons of availability shows effect
Chayovan (1982)	I + A + C	Moderate
Entwisle <i>et al</i> (1982)	I + C	Moderate to strong

^aI = Individual, A = Aggregate, C = Community variables.
Source: Appendix A

It is apparent that study designs vary quite a bit and that strong community effects are generally found when aggregate-level analysis is performed.

One can summarily state, on the basis of table 5.2, that:

- 1 Studies performed with communities as the units of analysis do find significant effects of level of development on use.
- 2 Studies performed with individuals as units of analysis and community variables added:
 - (a) find generally weak community development effects;
 - (b) find significant effects usually from community or individual measures of contraceptive availability.

Why is it the case that community effects on individual contraceptive practice are usually only weak or moderate? Several reasons are possible.

Measurement problems

If the community-level or aggregated data are incorrectly measured, one source of error may be in selecting the wrong social group boundaries. The reference group which most influences individual contraceptive behaviour may not be the village in fact but perhaps the immediate family or kinship group. Casterline (1982) experiments with various levels of aggregation of individual use and finds some support for greater contextual effects with proximity. However, he acknowledges that the dynamic behind the normative environment bears further study. Other studies have also mentioned their inability to evaluate the appropriateness of the boundaries existing in the data as operational measures of the community concept.

A second source of measurement error may be inherent in the community surveys where the nature of response biases due to the representative interviewed may be substantial. A follow-up evaluation of the Bangladesh Fertility Survey's community questionnaire has noted such differences (see appendix H of Bangladesh's *First Country Report*). For example, in 54 villages re-interviewed the response in the main survey on distance to an MCH centre was smaller in 13 villages, the same in 9, and greater in 21 villages. The average difference in responses between the two surveys was 1.84 miles. Chayovan (1982) too has questioned the adequacy and accuracy of the Their village data. One can imagine other technical problems with the reporting of distance or travel time to various facilities by village officials compared to individual residents. Some difference will undoubtedly be generated depending on one's physical location within

the community and its geographic area. Another example of incongruous responses arose in our analysis of Jordan's community data for 62 rural villages. Only one reported any type of contraceptive service available within village boundaries; and when matched to individual records, none of its residents reported use.

Measurement problems also enter in the operationalization of community factors. The studies here approach the measurement of village development in one of two ways: either an extensive battery of structural characteristics are entered in the model and the statistically, but not necessarily theoretically, significant ones survive the analysis of variance, or the structural characteristics are arranged into an index of development with factor analysis or *a priori* expectations about development patterns. Since a large part of this research is testing new waters, the experience to date is at least informative. The results have suggested that the process of rural development needs to be better understood and that for the indicators of development, most models fare better where substance dictates rather than follows measurement. One can not with a great deal of confidence advocate policy changes for specific community institutions based on the findings from the studies of Korea, Malaysia, Bangladesh, and Pakistan villages with the expectation of obtaining the desired increases in contraceptive behaviour.

Lastly, the homogeneity of the data very likely constrains what community effects are to be had on contraceptive use, after the individual variables are considered. The variance in an individual behaviour is much greater than the variance about the group means. When the variance of either level of measurement is not substantial, the expectations of large aggregate-level effects may be unrealistic. In addition, measuring the presence of a community facility, a railway station for instance, may not be the relevant developmental indicator as much as how frequently it is used. One may then observe little heterogeneity in rural areas in terms of availability of modern facilities but find much more in terms of their use. This point raises again the issue of having objective measurement of community factors and the subjective analogues.⁶

⁶ Multicollinearity is often raised as a technical problem in multi-level analysis (especially contextual analysis) but has not surfaced as a major obstacle in any of these studies. This is perhaps due to the separate sources for measurement of the two levels of variables.

Model specification problems

It is also possible that the observed weak effects of community-level variables, particularly development measures, are due to improper model specification. From the literature on the ecological and the contextual fallacies, it has been suggested that what are measured as macro-level effects are in fact grouped individual effects. However, it is unlikely that all models in these various studies are misspecified and certainly community effects from facilities directly associated with contraceptive use, ie health and family planning centres, have both empirical and theoretical substance.

Many of these studies have investigated cross-level interactions to determine if the community effect is strictly additive. If the individual response is also conditioned by the community situation, then model specification would be a significant problem. Moreover, if community effects are largely epiphenomenal, then significant interaction should be found. However, with two exceptions, systematic efforts to detect interaction find little or none of significance. The particular studies reporting this are by Palan (1979), Hong (1979), Nizamuddin (1979), Jones (1984), Engracia *et al* (1984), Casterline (1982), Alauddin (1979a and b), and Tsui *et al* (1981). On the other hand, Chayovan (1982) finds moderate interaction although the magnitude and direction of effects are irregular; and Entwisle *et al* (1982) find community contraceptive availability affects the likelihood of current use additively among older women, interactively with the desire for no more children among middle-aged women, and interactively with education among younger women. The Tsui study (1982) also suggests viable cross-level interaction where paired availability reporting at the community and individual levels jointly affects contraceptive use.

The varied findings need to be technically resolved. It has been difficult to apply analysis of covariance techniques, however, since a large number of community units are involved. It may be possible, too, to further examine residuals from linear regressions performed with various levels of measurement. This could assess the relative impact of unknown factors and their aggregate or individual nature.

One design approach that has not been pursued much is to model the adoption process within community type, thereby grouping individuals residing in communities with similar development features. The different coefficients across such groupings may reflect community effects and indicate that the relationships between individual variables and use are differentially enacted within certain types of communities. The

inadequacies of this approach are that it may confound correlations with unobserved variables and it does not allow the precise estimation of community effects and cross-level interactions as it is not a multi-level design. However, if rural development is not straightforward, ie the process responds to selective policy treatment and disparate exposure to modern ideas, such as from return urban migrants, then perhaps such cross-community comparisons will be worthwhile.

Problems of theory

Sociological theory has as its article of faith the influence of social values and norms. As Blau has stated:

'If a structural effect is observed, it invariably constitutes evidence that social processes originating outside the individual personality are responsible for the differences in the independent variable, since the influences of psychological processes have been controlled in the analysis.' (Cited in van den Eeden and Hüttner 1982: 91.)

Can this expectation be wrong in the case of contraceptive use? Is it true that family limitation is a motivational issue less responsive to exogenous structural forces than to personal initiative?

It should be stressed that this question is focused more at the magnitude of the community effect rather than its existence. Judged either by contributed explanation net of other variables or significant coefficients, community effects are found in multi-level analyses. However, the effect is small in most cases and the institutions providing the effect do not yield an intuitively appealing explanation as to why they should appear. Where strong effects are found, though, there is usually specific relevance to the community institution for the behaviour in question.

The belief that community effects on contraceptive use should exist and be substantial is a belief in social roles and the guiding norms for birth control. Macro-level theory has led us to expect that large scale social change in the direction of modernization will reduce demand for children and increase demand for contraception. Macro-level analyses of the impact of village development support this, but micro-level analyses with macro variables generally do not. Population control policy asserts that increasing contraceptive access will increase use independently of village development. This is usually borne out in the results. Perhaps the theory has been too general regarding the form and content of macro effects on micro behaviour. For studying change in demographic behaviours, we need to know whether our assumption of vertical arrangement of social decision-making units in fact prescribes a multi-level system of influence. We need to

determine further how best to measure variables at each level and which intermediate levels for what behaviours are important.

The current problems in social demographic analyses of family planning and fertility behaviour may then be due to the infancy of the research area. Perhaps too few levels have been specified in the model. Those studies with three levels tend to be more revealing of the nature of the aggregate effects than those with one or two. They identify a possible interface between community structure and individual adoption as being that of programme contact. Middle-range theories may be needed to locate other mechanisms linking collective group to individual behaviours.

This aspect, moreover, raises the possibility that only community institutions which are directly relevant for the analysed behaviour will have significant effects. The global characteristics of the community which measure its economic well-being and which reflect larger processes of social change may be influential largely in determining the *distribution* of individual well-being. This in turn affects the motivation for fertility regulation. Meanwhile, the service environment, which is specifically conducive to contraceptive adoption, becomes more salient among macro-level effects than other structural features of the community.⁷ From this line of reasoning, one would expect community development to be highly influential on other behaviours such as migration. Bilsborrow (1981) has made a strong case for studying community-level effects on internal migration in developing countries. He also cites other research where community variables have separable effects on breastfeeding or agricultural innovation practices. For example, Heer and Wu (1978) find strong community effects of infant and child mortality on subsequent fertility in Taiwan. This suggests that a broad range of studies should be examined to see if the specificity of the community institution is at issue.

The contraceptive servicing environment, as objectively reported and individually perceived and experienced, has in most of the reviewed studies accounted for much of the variation in use remaining after individual factors are considered. As a result it

provides a logical translation of community effects on individual contraceptive behaviour. The comparative dynamic between what actually exists and how it is perceived has thus far been examined in Mexico and the rural areas of the Philippines and Korea. How it leads to behavioural change presents the next major challenge to multi-level analyses. Such study will hopefully be pursued shortly in other WFS countries with suitable data, eg Malaysia, Thailand, and Egypt.

In the end, what should engage our attention now is not whether faith in the theoretical expectations of community effects on individual contraceptive adoption is misplaced but rather that these moderate to weak results should be viewed as encouragement of further work. The ensuing effort will entail refining measurement, clarifying the social concept of the community, and improving multi-level analysis techniques.

5.5 SUMMARY AND CONCLUSIONS

This review has been directed at community effects on contraceptive use. The studies available for consideration have by and large shown some, but not systematically strong, effects. The discussion has necessarily raised several analysis issues in order to place the empirical findings into perspective. Four of the analyses reviewed have used communities as the units of analysis and have identified certain structural features as significant determinants of contraceptive behaviours (Nizamuddin 1979; Alauddin 1979a; Hong 1979; and Jones 1984). However, they have focused on different contraceptive behaviours – knowledge and ever use of and access to contraception – and the features share little in common. Thirteen other analytical designs have been multi-level, involving the addition of global community variables or variables measuring aggregated individual behaviours to individual data. Again most find weak (Lee *et al* 1978; Nizamuddin 1979; Hong 1979; Palan 1979; Freedman *et al* 1981; and Chayovan 1982) or moderate (Anker and Anker 1982; Tsui *et al* 1981; Tsui 1982; Casterline 1982; Casterline and Engracia 1984; Engracia *et al* 1984; and Entwisle *et al* 1982) influences from the community variables on a variety of family limitation behaviours. One has to consider, additionally, whether the limited variance about higher-level measurements constrains their covariation with individual measurements, thus diluting the results.

It is equally possible that the positive effect expected of community development on use may not appear if the development process in rural areas has been stagnant or unintegrated in design. Rural devel-

⁷The path model in figure 5.1 suggests that contraceptive service availability at both community and individual levels conditioned the adequacy and accuracy of the Thai village development on adoption is then both direct and indirect through availability. Furthermore, the dashed line between the levels symbolically represents the middle-range linkages between macro and micro behaviours. Other levels of influence presumably exist and can be specified, perhaps following the lines of reference group theory.

opment strategies, such as land reform, agricultural extension and capital works, may have also been introduced only shortly before many of these surveys. For example, the Korean survey occurred in 1974 and the government's New Village Movement was initiated around 1972. The full impact may not be observable so soon. Further, one assumes that the development policies are integrated and coherent in formulation and implementation. In actuality the empirical results may reveal disjunctured and disparate efforts. The little statistical variation in rural development indicators thus can reflect similarity in depressed economic and social conditions across rural villages or the absence of impact from any policy efforts, either because of premature observation or unsuccessful outcomes. McNicoll (1975) has enumerated a number of local costs incurred by communities through involvement in such programmes which attempt to match the social demand for children with the private. Perhaps such costs have become apparent to residents and have neutralized the benefits to lower fertility.

The study of community-level influences on individual contraceptive use warrants further attention. If there is specific interest in evaluating the impact of village development on use, the studies seen here are equivocal in this regard. If interest is in evaluating the impact of community availability of contraceptive services on use, almost all these studies suggest that exposure to such sources can be important. There is further suggestion that the community service environment does not correspond exactly with individual perception and that the inter-relation between the two levels of 'reality' not only bears upon the evaluation of community effects, but also upon the reliability of a description of access when only one source of measurement is given. Perhaps the safest statement to make about the nature and extent of community effects on contraceptive use is that they exist, are of uncertain magnitude, and may be tempered by their substantive relevance to the behaviour in question.

As critical as it might be to have empirical justification for the investments in rural programmes to enhance fertility regulation, it is unfortunate that little consensus has evolved out of these studies. The technical problems of contextual and multi-level analysis also remain (cf Blalock 1979; Boyd and Iversen 1979). Certainly much more needs to be known about the dynamics of rural community life — local hierarchies of authority, the prominence of clan groups, the agricultural production and marketing system, and the government's tolerance of village autonomy in such affairs of self-governance. Once a multi-level structure of influence is proposed, the range of factors that can enter causally multiply exponentially. A comparative

study of select community institutions and their effects on contraceptive use, using a similar research design across countries, would have been helpful in answering this question. Such a study would have to be prefaced by a complete evaluation of the reliability of community data, tracing back to the stages of fieldwork and sampling of representatives. A follow-up comparison with other multi-level studies on other demographic behaviours would finally help provide the substantive context for evaluation. Perhaps with this kind of ordered assessment a better understanding can be obtained on how community systems can affect individual decisions about family limitation.

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Study	Data ^a	Level of analysis ^b	Dependent variable(s)	Community-level independent variables ^c	Findings on community-level effects
Anker and Anker (1982)	Gujarat, India 1970-71 467 couples with wife age 25-39 years in 11 rural villages; analysis performed separately for two castes	I + C	Family planning acceptance (ever use of sterilization, IUD, and condom)	Level of village development (based on road type, village education level, caste composition, and availability of electricity, water tap)	Village development level has a greater positive effect on family planning acceptance for lower than higher caste
Lee, Choi and Kim (1978)	Korea 1974 Subsample of KFS with 1141 ever-married women with matched community data from 60 census enumeration districts; study then selects 776 currently married, fecund, and non-pregnant women	I + A + C	Current use of contraception, including sterilization	Distance to government organizations Population size Per cent TV ownership Per cent radio ownership Mother's club activity Distance to village health and family planning services Per cent in-migration Per cent middle school attendance Distance to transportation and communication facilities Per cent newspaper ownership	Community-level variables provide weak explanation of contraceptive use, when individuals and aggregate variables present
Nizamuddin (1979)	Pakistan 1975 2884 currently married women 10-50 years in 193 rural communities	A + C	Knowledge of contraception	Access measures: family planning availability transportation centres education facilities agricultural extension facilities	Access to education (-) and agricultural extension (+) facilities significantly affect contraceptive knowledge, ordered after three other determinants (exposure to FP programme, husband and wife occupation)
		A + C	Ever use of contraception	Same as above	Access to education facilities (-) significantly affects contraceptive ever use, ordered after wife's education, exposure to FP programme and ideal family size

Appendix A (cont)

Study	Data ^a	Level of analysis ^b	Dependent variable(s)	Community-level independent variables ^c	Findings on community-level effects
Nizamuddin (1979, <i>cont</i>)		I + C	Knowledge of efficient methods	Same as above	Access to agricultural extension (+), family planning (+), transportation (+), educational centres (+) facilities significantly affect knowledge
Alauddin (1979a)	Bangladesh 1976 160 rural villages	C	Knowledge of clinical contraception ^d (pill, IUD, sterilization and douche)	All below are factor constructs: Access to water transportation Availability of sanitation facilities Access to local health and FP services Access to educational institutions Health and FP worker visits Presence of youth organization Mean education desired for children Mean education level	Significant positive effects on contraception knowledge from mean education desired for children, access to water transportation, availability of sanitation facilities, access to educational institutions, and presence of youth organizations
			Knowledge of non-clinical contraception ^d (condom, rhythm, withdrawal, abstinence)	Agricultural employment level Modern agricultural practices Access to <i>thana</i> -based health and FP services Access to educational institutions Access to local health and FP services Irrigation facilities Mean education desired for children Mean education level Health and FP worker visits	Significant positive effects found on non-clinical contraceptive knowledge from agricultural employment level, access to <i>thana</i> -based health and FP services, health and FP worker visits, mean education desired for children, access to educational institutions, and mean education level

Appendix A (cont)

Study	Data ^a	Level of analysis ^b	Dependent variable(s)	Community-level independent variables ^c	Findings on community-level effects
Alauddin (1979a, cont)			Contraceptive practice ^d	<p>Access to means of road and water transportation</p> <p>Number of radios available</p> <p>Agricultural employment level</p> <p>Presence of youth organization</p> <p>Access to local health and FP services</p> <p>Access to <i>thana</i>-based health and FP services</p> <p>Health and FP worker visits</p>	Significant positive effects found on contraceptive use from extent of health and FP worker visits, access to road and access to water transportation means, number of radios available
Hong (1979)	Kyongsang-nam Do, Korea 1975 2557 ever-married women 15–49 years residing in 53 rural villages	C	Ever use of FP	<p>New Village Movement rank</p> <p>Village rules</p> <p>Village type</p> <p>Economic rank</p> <p>Degree of centrality</p> <p>Village ceremony</p> <p>Boundary of co-operation</p> <p>Farm technology</p> <p>Availability of electricity</p>	Village rules (to control village affairs) most influential with New Village Movement rank, village type and economic ranking second in influence
		A	Ever use of FP	<p>Average frequency of (social) interaction</p> <p>Average number of sons</p> <p>Average FP information</p> <p>Sources are examples of 16 aggregate indicators</p>	Average number of FP information sources and average number of sons most influential and in positive direction
		A + C	Ever use of FP	Above 25 variables	Proportion of membership holders (measure of female participation in formal and informal organization) is most influential (and negatively) on ever use

Appendix A *cont.*

Study	Data ^a	Level of analysis ^b	Dependent variable(s)	Community-level independent variables ^c	Findings on community-level effects
Hong (1979 <i>cont.</i>)		C	Current use of FP	Same as for ever use	Village rules and degree of centrality are most influential of nine community variables on current use levels
		A	Current use of FP	Same as for ever use	Average family planning information sources most influential of 16 aggregate indicators
		A + C	Current use of FP	Same as for ever use	Average family planning information sources and village rules most influential of 25 variables
		I + C	Ever use of FP, current use of FP	Nine variables listed above for community-level analysis	Nine variables above explain less than 1 per cent of variation in individual ever and current use of FP. Of them, New Village Movement rank and village rules have some predictive power
		I + A	Ever use of FP, current use of FP	14 variables as mentioned above for aggregate analysis (except average family size and live birth/woman ratio)	Aggregate variables alone explain about 1 per cent of variation in individual ever and current FP use. Mean education, per cent membership holders, average number of FP information sources predictive of ever use. Per cent with newspaper subscription and average number of FP sources predictive of current use. Individual variables in combination with A or C variables explain 26 and 14 per cent of variation in ever and current FP use respectively

Appendix A (cont)

Study	Data ^a	Level of analysis ^b	Dependent variable(s)	Community-level independent variables ^c	Findings on community-level effects
Hong (1979 <i>cont</i>)		I + A + C	Ever use of FP, current use of FP	36 variables (13 individual including family planning exposure plus 23 A and C variables listed above)	Predictive community-level effects from proportion of membership holders for ever use; village ceremony, percent in-migration, degree of centrality and village rules for current use. Of individual variables, number of living sons predominates. Family planning exposure variables significant for both use measures
Palan and Mason (digested in Palan 1979)	Malaysia 1974 3800 ever-married women 15-49 years in 1500 rural villages	I + C	Knowledge of efficient contraception; use of efficient contraception; knowledge of place for FP services; use of place for FP services	Two indices (distilled from more than 100 village characteristics) used are: MEDIK — based on measures of availability of doctors, pharmacies, other FP sources WORKS — based on measures of availability of water supply, garbage collection facilities, and the like	Search for community-individual variable interaction did not yield any systematic evidence of such. Effects of community-level variables largely weak and insignificant. MEDIK significantly increases contraceptive behaviour variables only for Malay women married at least 10 years. WORKS significantly increases contraceptive behaviours among Chinese women married at least 10 years and residual minorities. WORKS has significant negative effects for Chinese women married less than 10 years
Tsui, Hogan,	Currently once-married women (for at least	I + C	Current use of contraception	Availability of FP services Community development	Community availability of FP services significantly increases

Study	Data ^a	Level of analysis ^b	Dependent variable(s)	Community-level independent variables ^c	Findings on community-level effects
Teachman and Welty-Chan's (1981)	3 years) 20-44 years in Korea 1974 (n = 840 over 60 rural villages); Mexico 1976 (n = 3722 over 519 urban and rural communities); Bangladesh 1976 (n = 2687 over 158 rural villages)			index: ^d Korea — based on per cent households receiving newspapers, distance to post office Mexico — based on per cent of labour force in agriculture, number of available public services, distance to secondary school Bangladesh — based on distance to telephone, newspaper delivery, number of available public services, number of available health services	current use levels net of individual education, community development with duration of marriage and parity up to 3 years before survey controlled
Tsui (1982)	Korea 1974, Mexico 1976 (same as above)	C + I	Current contraceptive use, unmet need	Five category variable combining objectively (O) and subjectively (S) measured availability of FP services (categories are both S and O are low, medium, or high, S > O and O > S)	Correspondent increase in combined S/O availability significantly increases current contraceptive use and decreases unmet need in both Mexico and rural Korea. Stronger positive effect on current use and negative effect on unmet need if S > O than if O > S
Gasterline (1982)	Currently married fecund women under age 40 who have never used contraception in Colombia 1976 (n = 978); Indonesia 1976 (n = 3705); Mexico 1976 (n = 2399); Peru 1977 (n = 2157); Thailand 1975 (n = 1351) across selected aggregations PSUs, regions, provinces)	I + A	Intention for future contraceptive use	Community-level contraceptive use (measured by per cent of all respondents in each respondent's area of residence ever using an efficient method of contraception; various levels of aggregation tested)	Significant effects of aggregate use on individual intention for future use not found uniformly across countries (strongest in Indonesia). At lower levels of aggregation pattern of effects sometime significant found among women desiring more children in Indonesia, Thailand, and Columbia. Little interactive (I × A) effect found

Appendix A (cont)

Study	Data ^a	Level of analysis ^b	Dependent variable(s)	Community-level independent variables ^c	Findings on community-level effects
Casterline and Engracia (1984)	Philippines 1978 4623 ever-married women in 352 rural communities	I + C	Generally individual perception of FP availability. This is examined against objective/community measures of FP availability	Community measures of FP availability	Cross-tabulation of community and individual measures of FP availability focus on all and nearest type of source and travel time. Two community-level sources recently introduced by national programme are recognized by municipal respondents but much less so by individuals. Current use status and desire for additional births do not influence reporting. Two sets of data provide very different pictures of FP availability
Jones (1984)	Currently married women under 45 years in Ghana 1979 (n = 4074); Paraguay 1979 (n = 2309); Philippines 1978 (n = 7768); Sudan 1978 (n = 2629); Venezuela 1979 (n = 2280) across local areas of residence (the PSUs which range from 144 in Sudan to 715 in the Philippines; restricted to localities where method sources known to individual respondents)	A	Proportion knowing a source for each of 6 FP method types (pill, IUD, condom, female sterilization, injection, and other scientific). Proportion knowing a source for pill in Sudan only	Average travel time to method source (squared and unsquared) Averages for individual characteristics (education, age, parity) Region in country (age and parity excluded in Sudan analysis)	Travel time, linear and quadratic terms, significantly and inversely related to knowledge of source for four methods in Paraguay, Philippines, and Venezuela; for pill in Sudan. Education and region sometimes are generally strong predictors of knowledge of source for all four methods and across all five countries. Test for interactions (linear time with other independent non-time variables) shows very few significant effects on knowledge of source. (Note: individual-level analysis of current use does not find clear or significant effect of travel time. This model does not involve any aggregated or community-level data.)

Appendix A (cont)

Study	Data ^a	Level of analysis ^b	Dependent variable(s)	Community-level independent variables ^c	Findings on community-level effects
Freedman, Khoo and Suprapitih (1981)	Indonesia 1976 4243 currently married, fecund non-pregnant women 15-49 years in 227 rural villages	I + C	Current use of modern contraception	Individual availability of: Education facilities Health facilities Market and bank Distance to nearest city in district Television Electricity	Village characteristics as representative of standard of living does not differentiate contraceptive use consistently. Control for individual region of residence, number of living children, and age reduces differentials
Engracia, Mortel, and Nartatez (1984)	Philippines 1978 4623 ever-married women in 352 rural communities	I + C	Current use of contraception	Community availability of a family planning clinic Community level of development (index measure of availability of telephone, telegraph, mail delivery, newspaper outlet, movie house, secondary school, and electricity)	Residents of communities with least access to FP clinics (far as opposed to within or near) are significantly less likely to be current users. Community development significantly differentiates use
Knodel, Debavalya, and Kamnuansilpa (1980)	Two national surveys for Thailand, 1978-9 and 1979; currently married rural women aged 15-44 (1966 cases in 1978-9, 1294 cases in 1979)	I	Current use of contraception; current use of pill	Family planning service availability – whether government health facilities located in village, in district or in neither	Multivariate analysis controlling for education, region of residence, number of living children or age, done separately within each service availability level. Local availability tends to increase use but is not apparently a necessary condition
Alauddin (1979b)	Bangladesh 1976 5023 rural ever-married women in childbearing ages, under 50 years	I + A + C	Knowledge of clinical contraception	Same as above (see macro-level analysis)	Village-level knowledge of clinical contraception, woman's educational level, desired versus actual number of children, whether children attended school or not, and duration of marriage were the significant predictors

Appendix A (cont)

Study	Data ^a	Level of analysis ^b	Dependent variable(s)	Community-level independent variables ^c	Findings on community-level effects
Alauddin (1979b, cont)			Knowledge of non-clinical contraception	Same as above	Village-level knowledge of non-clinical contraceptive methods, woman's educational level, desired versus actual number of children, age of woman were the significant predictors
			Ever use of contraception	Same as above	Individual knowledge of non-clinical contraception, desired versus actual family size, number of living children, individual knowledge of clinical contraception were significant micro-level predictors; extent of family planning worker visits to village and access to means of road transportation were significant macro-level predictors
Chayovan (1982)	Thailand 1975 2228 currently married rural women aged 15-49 in 183 villages	I + A + C	Ever use of contraception Current use of contraception	20 village-level predictors including region, language, family size norms, mortality level, availability of mass media, electricity, mean educational level, agricultural modernization, family planning contact, health facilities, time to district centre	Socio-economic development and cultural factors provide contextual effects; family planning inputs do not have substantial effect. Multivariate analysis of community effects only on individual contraceptive behaviour shows significant effects for family size norms. Also: (a) region or community language increases explanation in individual contraceptive use by 2-3 per cent

Study	Data ^a	Level of analysis ^b	Dependent variable(s)	Community-level independent variables ^c	Findings on community-level effects
Chayovan (1982, <i>cont</i>)					<p>(b) community variables alone explain 8–10 per cent variance in individual use and no distinctive community-level factors are systematically related to contraceptive use</p> <p>(c) individual and community factors explain 20–22 per cent of variance in ever and current use but most due to individual factors. Community variables explain about one-fourth of total variance accounted for, with their effects diminished after individual variables are controlled</p> <p>(d) some multi-level interactions found, with irregular patterns, for desired family size, education and family planning availability</p>
Entwistle, Herniman, Kamunan-silpa and Chamra-trithirong (1982)	Thailand 1981 4956 rural ever-married women 15–44 years old	I + C	Current use of efficient contraception	Actual distance to three types of outlets (tambol/village health centre, amphor/district health centre, and hospital) used for summary measure of objective contraceptive availability; micro-variables used are education, desire for more children, and age as a control. Interactions between availability and education and desire for more children assessed.	Multivariate (logit) analysis finds that availability significantly affects the likelihood of current contraception. Its effect is additive for 35–44 years old women, interactive with desire for no more children among 25–34 years old women, and interaction with education for 15–24 years old women.

^a If WFS, country and year are given.

^b I = individual level; A = aggregate level; C = community level. Multi-level analysis indicated by combination of above levels of variable measurement (eg I + C is individual-level analysis with community-level measures included in model).

^c Not exclusive of other individual attributes.

^d A factor construct.



Part II

The Nature of Community Effects and their Empirical Investigation



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6 Community-Level Variables and Institutional Factors in the Study of African Nuptiality

Etienne van de Walle

6.1 INTRODUCTION

Community-level variables and institutional factors raise very different kinds of issues. The terms community and institution are opposed in the same way as *gesellschaft* and *gemeinschaft*. Institutions can be defined as integrated patterns of behaviour that are fundamental parts of a culture. Marriage is an institution, part of a complex set of inter-relations which lie at the roots of social organization of kinship and transmission of property. National legal systems have regulated its forms and conditions, so that marital status usually constitutes a recognizable and unambiguous characteristic of any individual. Sometimes, however, the rules of nuptiality continue to be set largely by particularistic social units such as the ethnic groups. This can lead to demographically important differentials. Institutional diversity should probably be more perceptible in African data than in any other data, because of cultural diversity, and the present remarks will focus on African marriage.

Ethnicity may double up as a community-level variable in a survey. Freedman (1974: 5) has defined community-level or ecological factors as 'any characteristic common to all the persons living in the community'. He distinguished further between global variables and contextual variables. In the former category, the variables cannot be measured at the individual level: the presence or absence of a hospital or school in the community is an example of a global variable. More relevant to the study of nuptiality is the sex ratio of the community. The educational level of the community (as measured, for example, by the proportion of the population having completed primary education) would be an example of a contextual variable, since it has an individual analogue: each person in the survey can be characterized as having or not having completed primary education. Similarly, the proportion of the population of a community belonging to a specific ethnic group or tribe constitutes a contextual variable.

We are interested in community-level variables because they often appear to have an autonomous effect on the behaviour of individuals. An educated woman in a non-educated environment may behave differently — have more children, lose more of them to mortality, marry earlier, and so on — than a woman with the same level of education in a community where everyone has been in school. There is a collective impact which transcends the effect on individuals; the whole may be more than the sum of the parts. Understanding why this is so is likely to advance knowledge on the mechanism of the phenomenon studied. Explaining why herd immunity protects non-vaccinated members illuminates the nature of disease transmission.

In Freedman's examples, the phenomenon studied was fertility, but in the search for explanations it makes sense to decompose fertility into its proximate determinants. The impact of community-level factors on nuptiality deserves careful examination. But nuptiality is an unusually complex proximate determinant of fertility. Even if it could be downplayed to the role of denominator in fertility rates where exposure is specified as the time spent in unions, that time would be determined by many aspects of the women's marital history: marriage and remarriage, widowhood, divorce and separation, and the categories of exposure might be differentiated by age, type of union, duration, and so on. Various aspects of a woman's marital life influence her cumulated fertility performance. Moreover, as a societal institution, marriage affects the overall fertility of the population. The proportion married at various ages, the age at marriage of women and their husbands, the difference between these ages, the percentage of individuals who are widowed, divorced or separated, the incidence of polygamy, are all potentially important factors in the reproduction of social groups.

All the elements interlock in the marriage system. The word system implies that there is co-ordinated action of all the elements involved in the formation and

dissolution of unions. The system operates within the boundaries of a marriage market that includes all persons who are susceptible of contracting unions under the prevailing rules. The notion of market suggests both availability and acceptability. Only a global view of the system's operation within the market will enable us to understand or predict the effect of individual nuptiality behaviour on overall fertility. Where these exist, such customs as polygamy, child marriage, the levirate, prohibition of the remarriage of widows, and so on, impose quantitative constraints because of the limited number of partners in the market. Alternatively, the availability of partners may influence the prevalence of such customs. The polygamous marriage of a young woman to an old man may prevent the early marriage of a young man. Where all men eventually marry, the surplus of women which makes polygamy possible must come either from a large age difference between the spouses, or from the systematic remarriage of widows.

The net effect of any particular custom on fertility is difficult to assess in isolation. For example, polygyny may on one hand reduce the fertility of young women by pairing them with older males but on the other hand maximize the chances of older women to continue to bear children after their first husband has died. It has sometimes been speculated that the elimination of polygyny would lead to a rise in the birth rate, because the fertility of polygamous wives seems to be lower than that of monogamously married women. But this would only be true if banning the custom did not lead to countervailing effects, such as an older age at marriage for women, or a lower frequency of remarriages. How it would affect the nuptiality of men, and how that in turn would influence the birth rate, is conjectural. In another context, Coale (1981: 155) has stated that 'the effect of the remarriage of widowers is to *reduce* fertility because it often leads to a large difference between husband and wife in age at marriage'. On the other hand, the remarriage of widows tends to enhance fertility. The operation of the whole system must be considered to appreciate the overall effect of a custom.

The operation of the marriage system is often seen as the actualization of a collective purpose. Societies have demographic priorities:

'Primary value may be attached to having a son, to maintaining the purity of women, to keeping family property undivided, to marrying within the right class or caste, to the secondary education of some of one's children, or to maintaining numbers relative to other social groups. In practice these values may be located in specific demographic procedures: a particular marriage rule, a procedure of divorce and remarriage, birth order as a principle of inheri-

tance, selective abstinence or celibacy, and so forth. Such demographic facts may in important respects constitute groups in some of their most distinctive features. In characterizing different demographic regimes we should ask: To what social purposes are demographic relations organized? Which components are controlled and what other social values are ordered thereby?' (Kraeger 1982: 239)

As an example Kraeger states 'Nuer society, considered as a demographic regime, employs its marriage system primarily to establish social paternity' (ibid: 240). The idea of a specific organizing principle of the marriage system is often encountered. For example, Coale (1981: 155) states the following about many non-Western societies:

'The relevant feature of these societies is that custom apparently assures that virtually all women will be married for the first time at an early age; the extent of widower remarriage, polygyny and the like adapt themselves to the maintenance of this early and complete marriage of women.'

Or, at the level of ideology:

'More than 85 per cent of the population of Senegal is Islamic and marriage is conceived as the performance of a religious duty. For a Moslem, procreation is allowed only within wedlock.' (Senegal (1981) *First Report* vol 1: 61.)

Although such generalizations involve simplifications, they may be helpful in explaining the logic of seemingly unconnected practices within a given marriage system, and in relating them to a demographic regime which encompasses fertility. Thus the investigation of institutional factors, and their impact on the underlying rationality of the system, is not only a legitimate goal of research, but it can also only be neglected at the cost of greatly trivializing the level of explanation. We should add, however, that the search for organizing principles is bound to be difficult, and that the rigorous methods of demographic analysis traditionally have been more useful in debunking explanations than in reorganizing the material available into coherent theories.

6.2 SURVEY APPROACH

Surveys have not been powerless to explore the complexity of the nuptiality variable in its relation to fertility. But they have proven more adequate for measuring the interlocking parts of the marriage system than for fathoming its institutional rationality. The WFS surveys in African countries (to date, we have seen the first results for Kenya, Lesotho and Senegal) have investigated various aspects of nup-

tiality. They were tied to a household census that permitted the classification of the population of all ages by marital status. The Lesotho survey was limited to ever-married women; the Kenya and Senegal surveys covered single, married, widowed and divorced women. Questions were asked on age at marriage, age of husband, rank of marriage, number of co-wives, number of previous marriages and dissolutions and their dates, etc. One essential purpose served by the questions was to establish the period of exposure to fertility. Marital fertility was seen as the primary dependent variable, and nuptiality at most was an intermediate variable among others, to be retained for its influence on overall fertility. The survey asked questions on various independent variables which may affect the intermediate variables (including marriage) in autonomous ways, and operate either at the individual or the community level. These included education, occupation, religion and ethnic group; in Lesotho the latter was left out, in view of the homogeneity of the country in this respect.

It has been suggested that most of the variability of nuptiality in Africa is encountered with data relative to the following four subjects: type of conjugal union, polygyny, age at marriage and the stability of unions (van de Walle 1968: 236). *A priori*, the bewildering diversity of marital customs should account for that variability. The available data from WFS surveys in Africa largely confirms the special importance of the four topics singled out. Experience demonstrates, however, the difficulty of collecting data on these topics that would clearly reveal the impact of particularistic practices or institutions.

Types of unions

This is particularly true with regard to types of unions. There are usually several kinds of recognized forms of marriage, and several stages may exist in the completion of certain types. Radcliffe-Brown's (1950: 49) description of marriage as 'a developing process' remains valid. Census takers generally follow the simple rule of accepting the respondent's self-description as married or non-married. Most surveys which, in theory at least, could use more refined concepts, have failed to turn up any but the main marital statuses of the Western repertory.

Although the common intention was to cover all unions, whether formal or informal, the surveys considered here follow two slightly different strategies. In Kenya (*First Report* (1980), vol I: 70) marriage was defined to include both 'unions which had been sanctioned by religious or civil law and less formal unions which simply entailed living together in a more

or less stable sexual partnership'. In Lesotho too, all 'accepted forms of permanent sexual unions' were treated as marriage without distinction. In Senegal, however, a first question was meant to identify those legally married, and those women who reported themselves as single were asked an additional question to determine whether they were living in 'a state of concubinage'. The actual question was 'Do you live with someone?'. Although by all accounts consensual and free unions are not rare in Senegal, the survey only identified eight women out of a total of almost 4000 who admitted living in concubinage.

It may be argued that the type of union is not important for demographic purposes, as long as it can be determined that the woman is regularly exposed to the risk of pregnancy. Unfortunately, a large number of retrospective survey questions hinge on a precise definition of what is meant by 'union': number of previous unions, duration of union, age at union, and so on. For example, the Senegal survey asked (Question 206):

In what months and year did you marry your present husband? (begin to live with your present husband?)

The question was to be asked of 'concubines' to whom it would clearly not apply. It seems to be directed to women who started cohabitation some time before, or some time after their marriage. Both practices are widespread in Senegal. According to the Senegal Fertility Survey Report ((1981), vol I: 99), 'the period between the celebration and the consummation of marriage may last between several days and several years, depending mostly on the ethnic group'. There may also be consummation without cohabitation. Among the Serer of Sine, 'the spouse sometimes joins the conjugal residence only long after marriage (she is sometimes a mother by that time); the brideprice must have been paid entirely first' (Lacombe 1982: 26). In such instances, it is not clear whether the women should respond to Question 206 of the survey (see above) by giving the date of marriage or the date of cohabitation.

Does the phrasing of the question affect the estimates of the time of exposure? The results seem paradoxical at first. In 'permissive' Kenya, where all stable unions were recognized as marriages, 23 per cent of the women 'reported a premarital birth'. (This was not direct reporting, but the result of a comparison between reported dates of marriage and of first birth. In 'straight-laced' Senegal, where unions that had not been initiated by a religious or a civil marriage were treated as concubinage, the women with pre-marital births represented fewer than 3 per cent of all married women. (The *First Report* on pages 101-2 mistakenly

refers to pre-marital conceptions rather than to pre-marital births.) Thus at face value there is considerable promiscuous sex outside of stable unions in Kenya, whereas in Senegal 'the essential part of pregnancies will be conceived within marriage' (Senegal *First Report* vol I). But the finding may be nothing more than a consequence of the techniques of data collection. In Senegal the interviewers were instructed to use an age-event chart to mark marriage and births on an age-date line. This compelled more internal consistency within the women's date information. In Kenya, there is probably a great deal of random discrepancy due to errors in the reporting of dates. In neither case are we able to measure pre-marital fertility.

Polygyny

In Lesotho, 9 per cent of married women were in polygamous unions. The corresponding figures were 30 per cent in Kenya, and 48.5 per cent in Senegal. The prevalence of the custom varies a great deal between and within countries. It would be interesting to know for sure whether the fertility of polygamous unions is less than that of monogamous unions and why, but retrospective information collected in a survey is unlikely to resolve the issue. To do so, the questionnaire should devote much more time to mapping the entire marital history of the woman in close parallelism with her childbearing experience. It is not sufficient to know the woman's status at the time of the survey. Polygamous and monogamous marital exposure should be estimated, and related to the status at the time of conception. To explain the lower fertility of multiple wives, one would have to look at the circumstances of their entry into polygamy. One hypothesis is that some women are selected into polygamy because of their low fertility. Another hypothesis is that second wives are often inherited, and the match is one of convenience only. These hypotheses cannot easily be tested with the available survey data.

Age at entry in first union

Under African conditions, severe biases may be introduced when ages and durations must be estimated. In the Senegal Fertility Survey Report the median age at marriage reported by all women aged 15–49 years was 15.6 (*First Report* vol I, table 5.2), but the singulate mean age at marriage computed for the same women was 17.9 years (table 5.4). The difference between the two values is not explained by the difference between the median or the mean, or by changes over time. The inconsistency probably finds its origin in the women's inability to recollect their age at marriage. Respondents who don't know their age at the time of survey

may not be accurate when they report their age at an event in the past. 28.4 per cent of the women aged 15–19 (and 30.5 per cent of all women interviewed) reported having been married before age 15, whereas only 18.5 per cent of females aged 14 in the household survey were enumerated as married.

It has often been assumed that interviewers tend to attribute an older age to a married than to a single woman. In African censuses and surveys, the size of age groups 10–14 for females has often been clearly underestimated, and a plausible interpretation might be that this was due to the transfer of child brides to the upper age group, as the result of an assumption about normative age at marriage. In Senegal, however, recent age distributions do not exhibit the obvious biases of the past; moreover a substantial proportion of women claim to have been married before age 15. If we accept current age reporting as reliable, we must distrust the retrospective reporting of age at marriage.

Senegal is remarkable, among the three countries that have published their reports on the World Fertility Survey, by the very young age at marriage of women. In Lesotho and Kenya, the median is close to 18, and the singulate mean age to 20. The largest age difference between the spouses is for Senegal, where it amounts to 11 years; in Kenya, 59 per cent of the couples, and in Lesotho 75 per cent, has less than ten years. The ranking of the three countries confirms the relation between this variable and the prevalence of polygamy.

Stability of unions and their dissolution

In Senegal, almost 20 per cent of women reported having divorced their first husband, against 12 per cent in Kenya and 7 per cent in Lesotho. In all instances, divorce seems in general to occur in the early years of marriage. The notion of divorce is tied to that of marriage, discussed earlier, and is subject to the same definitional uncertainty. Marriage can also be dissolved by widowhood, and that concept has its own ambiguities. Henin has made the point in discussing the results of the 1973 National Demographic Survey of Tanzania (Henin undated, vol VI: 59).

'It is claimed that in certain tribes, when a woman's husband dies, she is inherited by his living brother, if he has one, and such a woman may appear in the survey as 'married once'. If this practice is still common, the incidence of widowhood may be underestimated to a considerable extent in some regions.'

This underestimation can be ascertained by considering whether the proportions of women who claim

Table 6.1 Estimated proportions of surviving first husbands and corresponding proportions surviving in models^a

Duration of marriage	Lesotho	Kenya	Senegal	West, level 16 $e_0^0 = 54.1$	West, level 20 $e_0^0 = 63.6$
< 5	99.3%	98.9%	98.3%	98.8%	99.3%
5–9	96.3	97.7	96.0	96.3	98.1
10–14	92.9	96.5	92.1	93.4	96.5
15–19	87.9	95.5	84.1	89.9	94.5
20–24	82.6	90.9	76.9	85.5	91.7
25–29	79.1	86.4	77.8	79.9	87.7
30 +	73.0	80.7	74.0	72.7 ^b	81.9 ^b

^aAssuming male age at marriage = 25.^bValue is for 30–34.

that their first husband is still alive are consistent with the mortality conditions in the country. Unfortunately, the results of the WFS surveys concern a different issue, ie whether the first marriage is still extant, or was dissolved by widowhood or divorce. The problem is that the divorced husband may have subsequently died. To make up table 6.1, we assumed that all divorces had occurred in the early days of marriage, and that they amounted to 9 per cent of unions in Lesotho, 12 per cent in Kenya, and 22 per cent in Senegal. The resulting 'proportions of surviving first husbands' are compatible with models of the West family of life tables, corresponding roughly to 54 years of male expectation of life in Lesotho, and 64 years in Kenya, with Senegal in between. These levels appear somewhat too high (although we do not have sufficient evidence about adult mortality in any of these countries). It is certainly possible that the number of previous marriages has been under-reported in the surveys.

6.3 ANTHROPOLOGICAL INSIGHTS

Results of WFS surveys suggest a diversified nuptiality despite the inevitable reductions to a common denominator imposed by standard questions and concepts drawn from western social science. To explain the recorded differentials, one must turn to other sources, including the rich anthropological literature that has described the cultures covered by the surveys. In general, anthropologists have been notoriously incapable of explaining fertility differentials, except in the vaguest terms; but they have provided many insights on marriage, its types and functions. The WFS *First Reports* for the various countries discussed here have occasionally tapped these sources to explain the results obtained in the surveys.

For example, the introduction to the Lesotho Report describes the two distinct forms of marriage recognized by the law: 'the Lesotho marriage, under the customary law, which is potentially polygamous and involves payment of *bohali* (bridewealth). Secondly, there is the civil marriage derived from the imported common law, which is monogamous and may take place either in church or in the office of a civil marriage officer' (Lesotho *First Report* (1981), vol I: 13). Similar distinctions between customary, legal and religious marriage exist probably everywhere in Africa. The payment of the brideprice retains a great importance. The Lesotho Report suggests that it is tied to fertility, and that payment of *bohali* should result in the birth of a child or children to the paying family. It is true that the transfer of brideprice generally confers paternity rights. There are forms of unions in many parts of Africa in which no brideprice is involved, and as a consequence, legal paternity stays with the kinship group of the women. Although it is difficult to generalize, it would seem that bridewealth remains an important aspect of marriage and fertility almost everywhere in Africa, and it has often been incorporated in the legal procedures of marriage sanctioned by the state. Because marriage payments are often spaced over time, marriage becomes a process, in contrast with religious and civil marriages which can be precisely located in time by a ceremony. In Islamic countries such as Senegal, where religious marriage is general, the bridewealth has also lost some of its importance to the benefit of dowries, gifts to the couple, and ceremonies. (See Goody (1973) for a discussion of bridewealth.)

Traditional marriages involve two kinship groups rather than two individuals, and in Senegal matches are often arranged by the families of the spouses (Senegal *First Report* vol I: 99). Arranged marriages tend to be more precocious as a rule for the woman,

and they may also lead more easily and early to divorce. Thus, among the Serer of Sine, 'first marriage, a product of familial arrangements, is soon broken' (Lacombe 1982: 10). Large bridewealths may explain in part the late marriage of males who must accumulate money and goods. Male migration may often be associated with the importance of marriage payments (Goody 1973: 9).

Although marriage payments do not constitute the purchase of a bride, they are connected with the economic roles of women and their place in agriculture. Boserup (1970) has hypothesized that in communities where the major part of agricultural work is done by women, 'we can expect to find a high incidence of polygamy, and bridewealth being paid by the future husband and his family' (quoted by Goody 1973: 46). Explaining the prevalence of polygamy by economic arguments has been recently attempted in the instance of two ethnic groups also examined in the Senegal Fertility Survey (Trincas 1982: 2):

'Among the Mandings of Senegal who in the past devoted themselves to warfare, and now cultivate peanuts, the women, who are all by themselves developing rice cultivation, represent a sure addition of wealth. Polygamy is paying off economically. But among the Diolas where men till riceland belonging to the women, increasing the number of wives would result in important additional work. This is probably why the Diolas often remain monogamous and have easily accepted this constraint by becoming Christians.'

In the Senegal survey, the percentage of married women in polygamous marriage was 54.4 per cent among the Mandings and 48.2 per cent among the Diolas, hardly enough difference to be conclusive, but in the right direction.

The examples given above all reflect the possible importance of institutional factors to explain nuptiality differentials. They have also been used to account for the existence of nuptiality changes. If adherence to tradition in Senegal explains early marriage, polygamy and prompt remarriage, such factors as education or urban living seem to have resulted in changes in nuptiality:

'Certain socio-economic factors such as schooling or urbanization led to a later mean age at first marriage in urban areas and explain why polygamy, which involves 49 per cent of married women, is less accepted among young urban or literate women who consider it as a type of union that is incompatible with the demands of the modern world.' (Senegal *First Report* (1981) vol I: 82.)

Modernization reduces the coherence of the insti-

tutional arrangements that were dominating tribal life. Access to economic opportunities and education weakens the amount of gerontocratic control. Cities are a magnet for young women reaching marriageable age. In the cities of Senegal, for example, the Diolas and Serer girls specialize as servants. Migration movements of young men are also often characteristic of certain regions and groups; in Senegal the Poulaars represent a large proportion of the labour migrants to Europe. These massive, age-specific movements create imbalances in the marriage markets.

6.4 IMPLICATIONS FOR WFS

In recent years, nuptiality changes have proven an important component of fertility decline in many developing countries, particularly in Asia. The changes seem to have been linked with structural transformations of the family, involving the economic and social roles of women. The potential for fertility changes in Africa during the next decades may well depend more on a similar evolution than on the wide-scale adoption of contraception. *A priori*, therefore, the study of nuptiality would seem to be an important component of any study of fertility. The experience of the WFS is not wholly satisfactory in this respect. The reasons have to do with the general weakness of the WFS in the area of social explanation. It has been said that the survey was more directed towards a mechanistic decomposition of fertility into its proximate variables than in the analysis of its determinants. The study of the marriage variable has similarly aimed mostly at accounting for the time of exposure rather than at assessing the relation of fertility and nuptiality as part of the social fabric.

When that is said, it is not necessarily obvious what could have been done to improve the survey. A great deal of exploration is still needed to assess what approaches would yield usable results. The survey questionnaire in general used a conservative and safe approach. Even so, as we saw before, ambiguity on the meanings of the questions often remains. Understanding nuptiality, its evolution and its functions in Africa would require connecting it to its institutional sources — the ethnic groups and the religious perceptions — without neglecting the influence of modernization in its various forms. This may be best achieved by investigations at the community level. It is conceivable that an operation such as a national fertility survey might serve as an opportunity for the updating of information on nuptiality customs. This might take the form of a survey of the anthropological literature. Community questionnaires might include questions on

types of unions, amount and modalities of marriage payments, features of the marriage market including the connection between marital status and migration, the economic roles of men and women, and so on. Informations derived from the census might be of considerable value as community variables. For example, sex ratio by tribe in various localities, the prevalence of mixed marriage, migration and occupation data by age and sex would be of interest.

As a rule, the surveys have provided no direct information on the particularities of the institutions regulating nuptiality among the respondents. Whatever interpretation has been provided in the official reports of the surveys was based on external sources. Inclusion of new questions in similar surveys in the future should be carefully weighed. At the very least, it should be possible to investigate whether the marriage was sanctioned by a civil or religious ceremony, and to distinguish traditional marriages from casual unions. The payment of a brideprice might be investigated. The question was asked in at least one survey in Cameroon; the results were inconclusive, as men tended to report they had paid, and women that their mates had not (INSEE 1968: 32). It may be feasible to investigate the circumstances that led to the union: was the marriage arranged, was the wife inherited, did she elope, etc? The concept of illegitimacy has probably little relevance in Africa, but that of social paternity may have a great deal of meaning. Fostering is widespread in parts of West Africa (Isiugo-Abanihe 1983), and it often involves first born conceived outside of marriage. Fostering customs involve more than 30 per cent of children in Sierra Leone or Liberia, and have poorly understood consequences of fertility and mortality. Ways have to be found to inquire about paternity in the course of collecting pregnancy histories. The results might shed light on a number of topics, including the consequences of polygamy on fertility.

The surveys collected data on ethnicity and religion, two variables with inherent institutional significance. Ethnicity in particular must be used at several levels in the analysis. First, as a global variable, ethnicity has a certain normative content. If in a particular tribe the interlocking of economy and culture gives a certain role to marriage, then this will provide insights for the analyst to interpret his findings. When the Kenya Fertility Survey found women married to women, it was possible to find cultural significance to what would have led to rejection of the data in another context. To have the desired effect, a knowledge of anthropology would have to influence the design of the questionnaire, the training of the interviewers and the forms of analysis.

At a second level, ethnicity must be used as a contextual variable. The tribal homogeneity of communities is likely to be an important variable in itself, and diversity is likely to be associated with modernization and the abandonment of tribal customs. Mixed marriages are likely to signal a similar trend. The WFS surveys asked no question on the ethnic group of the husband, but such information can be obtained from household data. The sex ratio of various tribes in a community may reflect characteristics of the marriage market.

At the individual level, the tabulation of nuptiality data by ethnic group encounters limits of significance when the survey has not been designed with that purpose in mind, and the sample has not been stratified by tribes. This is obviously the case in Senegal. The survey report insists on the importance of tribal differentials in nuptiality, and repeatedly contrasts such groups as the Mandings and the Diolas. As both of these groups provided less than 150 women to the sample, the significance of several of the findings is very doubtful. The aggregation of several groups may not help. For example the Senegal report regrouped under the name of Poulaars, the nomadic cattle-driving Peuls and the settled Toucouleurs who are heavily contributing to international migration, a combination that may dampen genuine differences. There is a need for surveys based on the World Fertility Survey that would be specially tailored to the study of one ethnic group at a time and would use carefully tested questionnaires aimed at stressing particularism rather than at reducing cultural diversity to fit in with Western concepts.

6.5 CONCLUSIONS

Among the means through which traditional societies implement their collective purpose, marriage is undoubtedly one of the most important and one of the most central. Nuptiality plays a role in the allocation of land, cattle and other resources, and in the reproduction of the labour force. Marriages seal alliances between kinship groups and assure the survival of the family line. One frequently encounters the notion that marriage in Africa makes the man 'whole', and it allows the woman to realize herself and fulfil her mission on earth. Marriage is universal and, for women, it is usually early. It is almost everywhere accompanied by bridewealth. As an agricultural and household labourer, the wife has important economic functions and is a source of wealth.

Because it plays such a central role, nuptiality reflects the particular social organization and changes

with it. Transformation of the role of women is likely to have a profound impact on age at marriage and the prevalence of unions, on the frequency of divorce and remarriage, and on the types of unions that prevail. Means of livelihood shape marital behaviour. Where the possibility of migration or urban life subtract the couple from the influence of the kinship group, changes are likely to occur in the marriage market and in the adherence to customs. Profound changes in nuptiality attended the economic and social transformation of Europe during the industrial revolution (Wrigley 1983), where the interplay of factors resulted in younger marriage and higher fertility. On the other hand, in Asia today profound transformations of marital custom result in opposite effects.

The nature and the rationale of the mechanisms linking society and marriage are poorly understood. Perhaps their complexity is to blame. Perhaps too, demographic research has badly neglected the study of nuptiality as no more than the handmaid of fertility and not worthy of investigation for itself. Certainly the WFS surveys have neglected marriage and downplayed the study of its inter-relation with the institutional factors.

It would not do to use ethnicity as a proxy for a residual of ill-defined customs. Beyond the explanations of nuptiality differentials that can be found in the peculiarities of tribal customs and normative beliefs, one must look for the social and economic factors which shape marriage patterns. Anthropological descriptions are often dated, and they tend to underestimate the power of individual adaptations. Certain tribal groups have specialized themselves in certain patterns of employment and migration streams. For example, more than 10 per cent of adult males were reported as temporarily out of Lesotho in the 1976 census. The impact of this fact on the relatively late age at marriage and the low prevalence of polygamy is hard to assess, but the effect of migration on fertility is probably greater than what can be identified in the Lesotho Fertility Survey. In several Asian countries, the opportunities for employment open to young females have probably contributed to a re-evaluation of what would be the most advantageous age at marriage for all the parties involved, including the parents of the bride. In Africa, where brideprice means a substantial expenditure of funds consented by males or their parents on behalf of females and their kin, any shift in the economic content of the marriage payments may lead to change in age of marriage or in the proportions marrying. Understanding the determinants of nuptiality will require a better understanding of the social world, well beyond the neatly ordered microcosm of the proximate determinants of fertility.

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7 Integrating Individual and Community Data in the Study of Contraceptive Behaviour

Albert I. Hermalin

7.1 INTRODUCTION

In a broad sense this paper, and others in this volume, attempt to reconcile two valued traditions within population studies. One strand is demographic transition theory which views changes in fertility, and related behaviour, as emanating from large-scale societal transformations such as urbanization, rising literacy levels, and movement from an agricultural to industrial structure. The other strand may be traced to the growth in the power and popularity of survey research which has permitted the collection of detailed information about individuals and families and which has prompted a number of influential models about individual (or micro) demographic behaviour. The challenge is how these two traditions of thought and analysis may be combined in order to achieve a more satisfactory understanding of demographic phenomena.

Until recently the micro and macro approaches have been separated, although it has been increasingly recognized that both types of factors play a role. The view taken here is that a multi-level framework which combines data on individuals with information on communities is both desirable and feasible. The substantive focus is on contraceptive behaviour, though the argument is easily extended to other phenomena with appropriate modification. Succeeding sections give the general strategy of multi-level analysis, a theoretical structure which incorporates both micro and macro variables, and a discussion of the sources and nature of the data to be employed. An empirical example and several potential models are then presented, followed by a concluding section which briefly treats a number of related issues.

7.2 GENERAL STRATEGY OF MULTI-LEVEL ANALYSIS

To employ the strategy of multi-level analysis requires

that there be reasonably comparable data on individual across the areas to be studied, as well as measures of relevant factors for the areas themselves. For example, the World Fertility Survey provides comparable data on individuals in a large number of countries, and a large array of demographic, social, and economic characteristics for each country can be obtained from statistical handbooks published by the United Nations and other international agencies. Thus one has data on individuals as well as on the countries in which they reside. The same approach can be taken *within* a single country: the WFS surveys, the Contraceptive Prevalence Surveys (CPS) and other surveys provide information on characteristics of individuals, and data on the characteristics of the communities in which they reside can be obtained from a variety of sources. These include census data, service statistics, community-level modules, and special investigations, as described in greater detail below. Therefore, the strategy of multi-level analysis can be employed to study differences across countries, employing individual-level data and country characteristics, and differences across areas within a country, combining the individual-level data with characteristics of each community.

The application of the multi-level framework to the set of WFS countries has been described in some detail in Hermalin and Mason (1980) and Entwisle *et al* (1982a). In working with surveys across a reasonably large number of countries, one can conceive of the analytic strategy as a two-step procedure. At the first stage, the individual data for each country is analysed. At the second stage, the country-level data, adjusted for the results of the first stage, are employed. For example, assume interest centres on factors associated with contraceptive use, and that regression analysis is appropriate. The same regression equation can be estimated for each country, producing a set of intercepts and regression coefficients across countries. The problem thus becomes one of explaining why relationships (the regression coefficients) vary over countries.

From this standpoint, multi-level analysis is a way of enriching the range of questions addressed by aggregate analysis. Relationships derived from individual-level analyses are added to fertility rates, means, and other summary characteristics as possible dependent variables.

This paper focuses on differences within a country and, though the two-stage procedure is a convenient way of conceptualizing the multi-level strategy, in practice within-country analysis will rarely be able to proceed in this fashion. Surveys in any given country tend to be modest in size and to utilize a large number of clusters or primary sampling units, so that there are only a small number of individual observations per cluster. For example a survey of 6000 women over 200 villages would yield an average of only 30 women per village. In this situation one could not satisfactorily estimate an individual-level model of any complexity within each village. In this instance the investigator can still study whether the individual-level regression coefficients vary over villages and the manner of this variation with community characteristics. This is accomplished by introducing the characteristics of the village as contextual variables into the individual-level model. This would produce an equation as follows:

$$Y_{ik} = \alpha_0 + \alpha I_{ik} + \delta C_{ik} + \phi I_{ik} C_{ik} + \varepsilon_{ik} \quad (1)$$

where I is an individual-level characteristic, C is a village characteristic, α is the regression coefficient of the individual-level variable, δ is the coefficient of the village characteristic, and ϕ is the coefficient of the interaction term; i denotes individuals and k denotes villages. Each woman in the same village would have her own value on I and the same value on C , but C would vary from setting to setting.

As a simple example, let Y be whether or not a woman uses contraception, I be her education and C be a measure of programme input, dichotomized into a dummy (ie binary) variable denoting low ($=0$) vs high ($=1$) input. In this case, α would represent the effect of education on contraceptive use of woman in the low input villages, δ would measure the effect of high input on contraceptive use and ϕ would indicate that there is an interaction effect between I and C so that the effect of education in high input villages is $(\alpha + \phi)$ rather than α . Compared to a model which is strictly micro or strictly macro, equation (1) allows both individual and village characteristics to determine the dependent variable, while at the same time examining how the village characteristic affects the *relationship* between education and use. Thus equation (1) provides insights similar to those from the two-stage procedure described above.

A framework which allows for interaction between individual and community characteristics is important because there is some evidence from Taiwan and other countries that in the early stages of the family planning programme there was not only a rapid increase in prevalence with increasing inputs but also a rapid change in differentials of use across educational and other social strata (Freedman and Takeshita 1969). This contraction of differentials can be interpreted as an interaction between programme inputs and women's education in which those with less education responded more to a unit of input than those with higher education.

The logic of equation (1) of course is easily extended to more than one individual-level and more than one village-level characteristic. Multi-level analysis, in common with other strategies which seek to explain demographic phenomena, requires in the first instance an adequate model of the underlying dynamics. Indeed the requirement for adequate specification may be viewed as even more demanding than approaches which are solely micro or macro in structure. Omission of a strategic individual-level variable may lead to ascribing an effect to a macro characteristic which is truly micro. Moreover, attention must be given to the causal ordering of the micro and macro variables and to their interactions. The next section, therefore, develops a theoretical structure for applying multi-level analysis to contraceptive behaviour.

7.3 ANALYSING CONTRACEPTIVE BEHAVIOUR: A THEORETICAL FRAMEWORK¹

An influential model of fertility, suggested by the work of Freedman (1975) and Easterlin (1978), and adopted by the National Academy of Sciences panel on the determinants of fertility in developing countries (Bulatao and Lee 1983) is given in figure 7.1. The model assumes that each couple has a demand for some number of surviving children which serves as a basis for assessing the sufficiency of their supply (or likely number of surviving children) at any given point. Once supply reaches or exceeds the desired number the couple is motivated to some degree to control their fertility. Whether they do so or not is affected by the means of fertility regulation available and their costs.

¹Sections 7.3 and 7.4 of this paper draw on Fertility Regulation and Its Costs: A Critical Essay prepared by the author for the National Academy of Sciences. See Hermalin (1983).

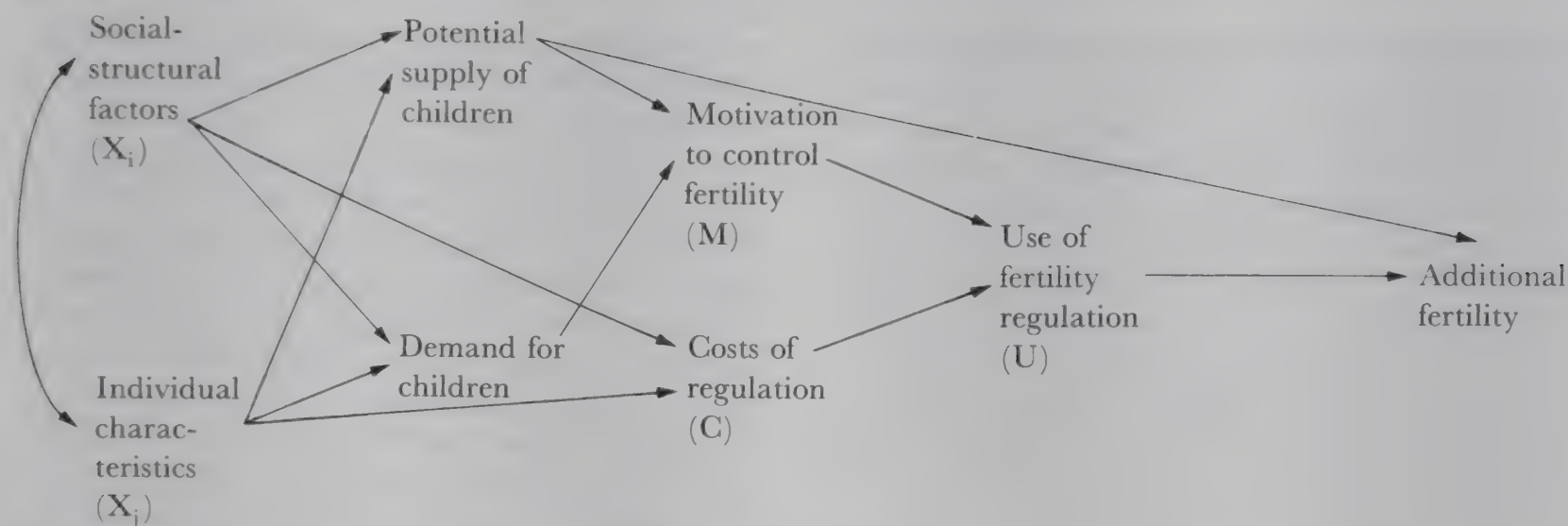


Figure 7.1 Basic model of factors determining additional fertility

The concept of costs, to which we return below, is multi-dimensional including economic factors (money and time), social attitudes (the possibility of violating current norms and facing sanctions) and health and psychic elements (the fear of trying something new which may be to some degree risky or unpleasant). These categories make clear that costs are a function of both individual and social structural characteristics. They will be determined by a couple's economic position, social standing, and other traits; at the same time a community may raise or lower costs by its prevailing social attitudes which encourage or discourage fertility regulation, through the delivery system of family planning services which affects accessibility, and by its pricing mechanisms.

As illustrated in figure 7.1, individual and social structural factors not only influence the costs of regulation but also determine the demand and supply of children, which in turn define motivation. The specific characteristics affecting demand and supply, however, need not be the same as those influencing costs.

The structure of the model assumes that all fertility regulation behaviour will be for the purpose of limiting rather than spacing births. Insofar as the use of contraception for spacing is a growing feature in many developing countries this is a serious omission which requires theoretical and empirical attention. (The illustrative analysis presented below will return to this issue.) In general the model is more easily applied to a specific action or point in time such as parity at first use of contraception or current use than to the representation of a contraceptive career which requires attention to periods of use and non-use as well as reasons for using.

Though it is possible in principle to estimate the entire structural model, it is common to focus on selected parts. The 'semi-reduced' form which shall be emphasized here is illustrated in figure 7.2. Interest will centre on how motivation and costs combine to determine fertility regulating behaviour, and on the exogenous social structural and individual variables. Comparison of figures 7.1 and 7.2 brings out an

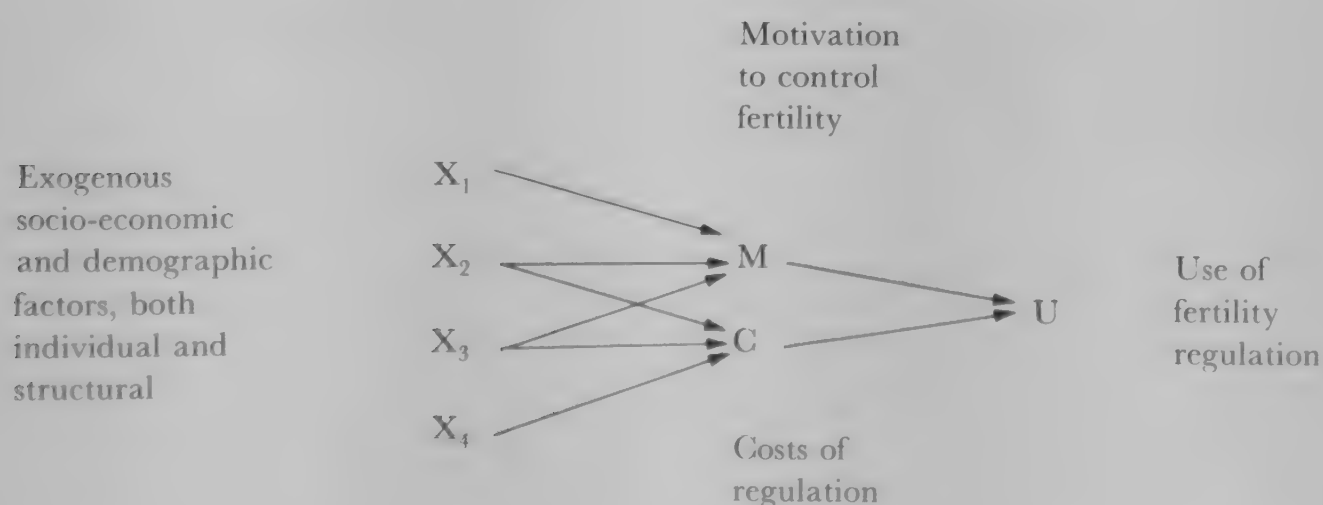


Figure 7.2 Basic model of factors affecting fertility regulation

important implication: only those exogeneous factors which are determinants of supply and demand are logical determinants of motivation.

Figure 7.2 is a model of individual or couple behaviour but it includes social structural or aggregate variables as one set of exogeneous factors. Hence the overall model is contextual or multi-level. The next section takes up the problem of specifying and operationalizing the individual and social structural factors, giving particular attention to the question of whether a particular concept is best measured at the individual or aggregate level.

7.4 MEASUREMENT ISSUES

Embedded in figure 7.2 is a simple three-variable model which states that motivation and costs determine fertility regulation.² Motivation has generally been measured either through a direct question of the form, 'Do you want another child sometime?'; or by comparing the total number of children reported as ideal or desired with the actual number living or another indicator of supply. Both measures involve a balance of supply and demand and have been shown to be consistent and meaningfully related to behaviour.³ (See Hermalin 1983 for a review of several studies.)

Given a direct measure of motivation, figure 7.2 indicates that any other independent variable included in the model must be justified as either a direct or indirect measure of costs. As noted previously, the concept of costs is multi-dimensional and until recently direct measurement has been limited to a few aspects. Knowledge of contraception (in terms of recognition of specific contraceptive methods) has received the most systematic and longstanding attention, being a standard feature of earlier KAP surveys and incorporated into the WFS structure. Results presented by Vaessen

(1980) show a relatively high degree of uniformity across countries in the awareness of the existence of contraceptive methods.

In recent years, there have been attempts to measure other types of knowledge which might influence the decision to use contraception, such as knowledge of an outlet for services, perceived distance and time (or means of transportation and time) to the source, and degree of contact with family planning personnel. The development of these measures and examples of their use are provided by Rodríguez (1977, 1978) and Lewis and Novak (1982). Various dimensions of perceived availability and accessibility are included in the WFS and CPS surveys.⁴ Data on direct monetary costs have also been available through the operational policies of programmes and Schearer (1983) provides international comparisons of prices for specific methods from the public and private sectors. Within a country, however, prices are not likely to be highly variable, at least within sectors. The degree to which methods are available from the public and private sectors can vary from community to community, and the effect of sector mix on contraceptive use can be highly relevant for policy.

There have been a large number of studies focusing on side effects of various contraceptive methods. A review of clinical and epidemiological studies pertaining to the serious health hazards, as well as minor side effects, associated with the major methods of contraception is provided by Schearer (1983). From the standpoint of contraceptive prevalence in a given community, the crucial factors centre on the way that the mix of individual fears, knowledge, and experience affect the decision to adopt a method or continue its use, and the role of service providers and community attitudes in mitigating or exacerbating these concerns. Possible approaches to incorporating these dimensions will be dealt with below.

The wide array of subjective costs, other than fear of side effects, related to the costs of contraceptive use has received relatively little study. Bogue (1983)

²Though the model under discussion concerns fertility regulation in general, the focus of this paper will be on contraceptive use. Determinants of breastfeeding or abortion would require appropriate changes in the variables employed.

³It should be noted that in the model depicted in figure 7.1, demand and supply define rather than cause motivation to control. If supply exceeds demand, motivation is presumed to exist; if supply is less than demand, motivation is absent. Stated otherwise, supply and demand are components of motivation, and once they are measured the degree of motivation is known. Thus, motivation does not mean 'determination' or 'resolve' in the usual sense of those words. Under this framework a factor can affect motivation only by affecting supply or demand. A factor which influenced resolve or determination to regulate fertility, but did not affect motivation as defined, would represent some aspect of costs.

⁴Rodríguez uses 'availability' for knowledge of a source, and 'accessibility' for time, distance, and means of transport to that source. Lewis and Novak define 'availability' as including both effective knowledge of a source (whether couples have sufficient knowledge about a source to obtain contraception if they so desire) and proximity (travel time, travel mode, and convenience). They regard availability as one aspect of general accessibility, which also includes such factors as costs, quality of services, availability of medical personnel, and adequacy of supplies. The WFS and CPS differ somewhat in the questions asked but neither attempts to cover the spectrum of topics included in the Lewis and Novak definition of general accessibility.

reports on an Egyptian survey which attempted to determine the saliency of a large number of subjective costs, grouped broadly into threats to cultural norms, social adjustment, and personal adjustment, and psychic threats to physical and mental health.

In measuring the various dimensions of costs, the greatest reliance has been placed on fertility and related surveys of individuals. Insofar as these measures are taken as determinants of contraceptive use, there is an inherent simultaneity of effects. Contraceptive use affects reported knowledge and attitudes while these in turn are taken to affect current contraceptive behaviour. Since earlier knowledge and attitudes cannot be established from a cross-sectional survey, the inherent simultaneity cannot be unravelled from data in the survey. As a result analyses incorporating current knowledge and attitudes as determinants of use are likely to provide biased and misleading conclusions. In addition it should be recognized that the questions on availability currently incorporated into the WFS and CPS surveys do not attempt to elicit from the respondent the nearest source but get a mixture of travel times to actual, preferred, and known sources conditioned on method knowledge and contraceptive experience. It is difficult to disentangle and utilize these data unambiguously in a micro-model.

One solution to the problem of simultaneity is to carry out individual-level longitudinal analysis in which knowledge, attitudes and other aspects of costs, as well as contraceptive behaviour, are traced over time. This type of design is costly, however, and not without problems of maintaining the panel and avoiding contaminated responses. It should be noted, however, that it may be possible to capitalize on circumstances that produce ongoing contact with users to collect longitudinal data. For example, where services are clinic provided or part of an integrated maternal and child health/family planning programme, it may be possible to conduct baseline surveys of adopters to determine their knowledge and relevant attitudes, and then provide mechanisms for testing to see how these relate to their subsequent length of continued use or risk of pregnancy. But this represents a rather specialized type of study.

A more general and feasible solution stems from recognizing that many elements of costs, though by no means all, are properly conceptualized and measured as programme or macro characteristics, rather than of individuals. This is true of key components of market cost such as availability of contraceptive services and information, method mix, prices, access to outlets in terms of time and distance, types of personnel utilized, public-private sector mix, hours of operation of key

outlets, etc. These are essentially characteristics of the programme or the community and the same value can be assigned to each village or small geographic cluster. This is also true of some of the social and cultural factors often included under subjective costs: social norms and values affecting contraceptive use are properties of aggregates of individuals.

The macro-level measures of accessibility outlined above may be obtained in a variety of ways. Some of the data on number of outlets, types and numbers of personnel, hours of operation, etc may already exist in the records of the family planning programme and private providers. In other instances they may have to be obtained by a special effort such as measuring the distance from the centre of each village or small geographic cluster to each major outlet; conducting an inventory of personnel, mode of operation, methods provided, etc at leading outlets; or questioning leading figures in the community and at the outlets about special features of services. Even where special investigations are needed these should not prove costly, since the data are required only for communities that are sampled as part of the fertility survey, and for items that are likely to vary over communities and be salient for contraceptive adoption or continuation. Thus if the hours of all official outlets are the same and they have similar staffing configurations, these elements are not relevant macro-level measures of cost for understanding variation in contraceptive prevalence. It should be clear that the structural elements of the programme which are more or less influential in determining contraceptive use are likely to vary from country to country and will require an initial review of the programme and discussions with relevant administrators to identify factors which are salient and variable over communities.

Obtaining measures of social norms and values that are part of the regulation cost structure requires a different strategy. One possibility suggested by Casterline's (1982) WFS analysis is to aggregate individual survey data on appropriate items. For example, Casterline used the level of contraceptive use in a community as an aggregate variable to predict intention to use in the future among never users, on the assumption that the community's level of use reflects its norms about contraception and therefore affects expressions of future intentions. This logic can be extended to other cost elements: one can test whether the intentions of never users are a function of the level of knowledge in the community, the level of approval of family planning, or perceived conflicts of family planning with religious beliefs or prevailing social attitudes. The degree to which fear of side effects and health hazards affect contraceptive use can be tested in

a similar manner. As examples:

- 1 Intentions to use among never users can be treated in part as a function of users reporting side effects or concern with health hazards.
- 2 The choice of methods of users and their continuation rates can be studied as a function of the proportion of never users who say that fear of side effects or health hazards are the main reasons for non-use.

The general point is that aggregate variables of cost-relevant items which are properly community-level can be derived from survey data and used as partial determinants of contraceptive use, if due attention is paid to cause-effect ordering.

To this point interest has centred on factors that are likely to have a direct effect on costs. There are many aspects of community structure which are likely to have an indirect effect on costs or motivation and it is difficult to make a short list. Many of the relevant items have been the focus of the WFS community-level module and similar efforts. One broad category concerns the extent to which the community has contacts with the 'outside world' through mass media. This involves not only the prevalence of movies, television, newspapers and magazines, but the content of the messages received. Programmes and materials that foster aspirations for new life-styles should not only increase the motivation to adopt fertility regulation but reduce the subjective costs of experimenting with contraception (Freedman 1979).⁵ The various measures of modernization commonly obtained, such as educational and health facilities, the availability of electricity and modern goods, etc, operate in a similar fashion. Here it may be important to obtain, in addition to the usual inventory, measures of recent change. Two communities may both have a secondary school but one is a longer standing, rudimentary institution while the other is a new, modern facility. The impact might be quite different in the two cases.

Other measures of relevance would attempt to discern structural factors which affect the likelihood of a critical mass of innovators and the speed of diffusion. Depending on the society, possible indicators of this process might include:

- 1 The size of the middle class and measures of income distribution; or measures of the concentration and distribution of land holdings.

- 2 Distribution of the labour force, with particular attention in some settings to the degree to which agricultural families engage in off-farm employment.
- 3 The ethnic distribution of the community, to identify the possible existence of enclaves which hinder community-wide diffusion of ideas.
- 4 The existence and utilization of farmers' associations and other organizations that might serve to readily diffuse new information.
- 5 The type of political structure, and the nature and popularity of the leadership.

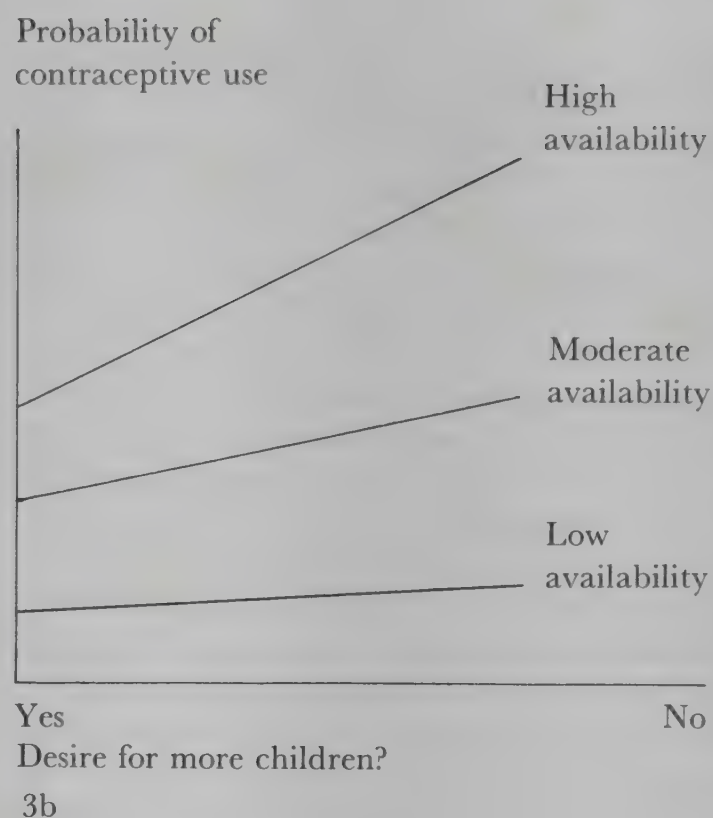
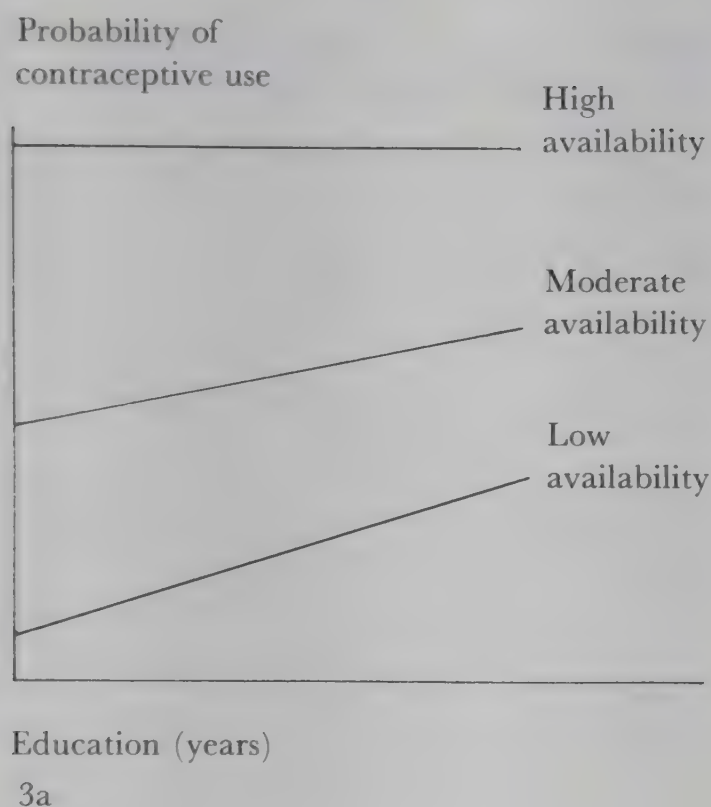
As with the structural elements of the family planning programme which may directly affect costs, the indirect social and economic structural factors are likely to vary from country to country, and will require an initial review to identify a manageable list which can be pursued in some detail.

7.5 EMPIRICAL EXAMPLE AND OTHER POTENTIAL MODELS

This section reviews an example of a multi-level analysis of contraceptive use and outlines additional models that might be undertaken. The example is based on the second round of the Thailand Contraceptive Prevalence Survey (CPS2), conducted in 1981 and is drawn from Entwisle *et al* (1982b). As part of this survey, field supervisors determined for each of the 193 rural villages in the sample the actual distance to the tambol (subdistrict) health centre and to the district centre. A measure of actual availability is derived from these data. The individual characteristics used as independent variables are the desire for more children and wife's education. The dependent variable is current contraceptive use. The micro-model is thus a smaller form of that shown in figure 7.2. The desire for more children is used as a measure of motivation to control fertility. Education is treated as a determinant of motivation and as a direct determinant of contraceptive use since it subsumes a number of socio-economic characteristics related to costs (eg knowledge, income, attitudes) not explicitly measured by actual availability.

The authors hypothesize positive relationships between the probability of contraceptive use and education, the desire for no more children, and actual availability. An important feature of the analysis is that the strength of the micro relationships is hypothesized to depend on the level of actual availability. Women who desire no more children should be more likely to use family planning when services are available. Figure 7.3b, taken from Entwisle *et al*, shows how

⁵In keeping with the proposed framework, the effect on motivation is most likely to arise through the reduction in demand for children.



Source: Entwisle *et al* (1982b), figure 2.

Figure 7.3 Interactive multi-level model

the micro relationship between desires and use may vary with actual availability, from a weak positive relationship when availability is low to a strong positive relationship when availability is high. Similarly the relationship between education and use may be expected to vary with actual availability of services. Educational differentials in use arise in part because women at different educational levels will differ in knowledge of methods and sources as well as the resources with which to obtain supplies and services. If greater availability reduces these differentials, it will weaken the positive relationship between education and use. The authors' illustration of this is shown in figure 7.3a. Thus figure 7.3 represents the essentials of a multi-level model of contraceptive use in which the macro determinant, actual availability, interacts with two micro determinants, education and the desire for no more children.

A logit regression analysis was performed separately for three age groups of rural women, namely 15-24, 25-34, 35-44. For the 25-34 age group, actual availability interacted with the desire for more children in the manner predicted, but there was no significant additive effect from availability nor a significant interactive effect with education. For the oldest group, there was a substantial additive effect of availability but neither of the hypothesized interactions were significant. For these two groups, where contraceptive use for limiting family size predominates,

the reduction of costs associated with greater availability had either an additive effect or an interactive effect with motivation as predicted. The failure to find an interactive effect with education may be due to the reduced differentials across educational groups in contraceptive use existing by the time of the survey. The hypothesized interaction might have existed at an earlier stage of the programme, and might be more manifest in other countries whose programmes have not reached the stage of success and maturity characterizing Thailand in 1981.

The results for the youngest age group show the importance of taking account of contraceptive use for spacing and developing appropriate models for this behaviour. Over 40 per cent of the 15-24 year olds were using contraception, although only 25 per cent want no more children. The logit analysis for this age group reveals that actual availability does have a significant interaction with education, but not in the direction predicted. Availability accentuates the positive effects of education on the likelihood of use. This would follow if personnel in programme outlets were encouraging the spacing of children and, for younger women who are the main audience, the more educated were more responsive to this departure from traditional patterns of childbearing.

The foregoing analysis must be taken as illustrative of the potential of multi-level analysis to elucidate the micro and macro factors affecting contraception.

Only one programme factor was included and this was measured rather crudely, leaving implicit differences in the number of nearby outlets and in the services offered. It is therefore difficult to determine which aspects of availability account for the effects observed. This limitation can be overcome by incorporating more detailed data about programme characteristics at the community level.

The importance of an adequate multi-level model was noted earlier. It is possible that the results overstate the effects of availability by omitting other community characteristics relevant to contraceptive use. An argument can also be made that the effect is understated. This would come about if the availability of outlets directly influenced family size desires and thus the response to whether more children were wanted; or if women implicitly took costs into account in reporting their desire for more children.⁶

Multi-level analysis may be used to investigate a number of questions related to the fertility regulation process. These would include studies of number of children desired, contraceptive prevalence, the effectiveness of contraceptive use, and the utilization of contraception for spacing children. In each case what is required is an appropriate model specifying the way the micro and macro variables inter-relate and affect a properly defined dependent variable. The independent variables employed in one model might not be the same as those employed in another.

Consider a programme with an explicit educational objective to reduce the demand for children. Table 7.1 presents in schematic form how multi-level analysis might be used to study whether a programme's information, education and communication (IEC) efforts have had an impact and, more particularly, which strategies have been most productive. In this case, the analysis would proceed by regressing the dependent variable – desired number of children – on the individual- and community-level independent variables and hypothesized interactions between the two. Coefficients of the interaction terms would be of particular interest. One might hypothesize, for example, that the relationship between education and desired number of children will differ in communities with high versus low IEC efforts: successful IEC might reduce the desired number of children to a greater extent among the less-educated than among the more-educated. Similar reasoning would suggest interactions between the modernization and communication variables and education.

Table 7.1 Outline of multi-level model for studying effects of family planning programme on desired number of children

Dependent variable (individual-level)	Desired number of children
Independent variables (individual-level)	Wife's education Husband's occupation Wife's labour force status Childhood residence Age
Independent variables (community-level)	Programme inputs (IEC efforts, or personnel and facilities) ^a Modernization (electricity, educational facilities, health facilities, etc) Communication (movies, television, etc) Distance to nearest city Region
Major interactions	Programme input × education Programme input × labour force status Modernization × education Communication × education

^aMeasures of mass media appeals per community and educational efforts of field and health workers.

7.6 ISSUES IN DATA COLLECTION AND MODELLING

This section briefly treats several issues in data collection and modelling which have received relatively little attention to date.

Many of the past efforts in obtaining community-level data have placed little emphasis on reliability. Often the information is collected from a single informant by a supervisor or interviewer after the round of individual interviews in a village has been completed. Typically, there is little time or effort expended in checking the responses received. Data dependent on direct observation or measurement may likewise be left in the hands of only one or two people. Since a relatively small number of sampling points are employed in a survey, errors on the community level can have large effects on the results.

A number of basic steps would improve the reliability of community-level data. Items based on informants, or direct observation and measurement (eg distances)

⁶These 'effects' were suggested by Bryan Boulier in a personal communication.

should use multiple reports, with attempts to reconcile differences carried out either in the field or by use of existing documents and records.

Multi-level analysis may also be prone to a problem of data reduction. If a large number of characteristics about the family planning programme as well as the social, economic, and political structure of the community are collected, it may be difficult to incorporate them all in a meaningful manner in a single equation. Existing theory and the initial review of a country's programme and social structure, advocated above, may assist in selecting relevant variables. Beyond this, it is possible to construct indexes and engage in other standard forms of data reduction, but these steps may mask important policy variables. It may be more useful to contrast alternative specifications of the macro dynamics by comparing results which use different combinations of macro characteristics that represent competing hypotheses.

Equations that combine micro and macro data have complex error structures that require special techniques for proper statistical estimation (Mason 1980). New computer programs for carrying out appropriate maximum-likelihood estimates have been developed in the course of a large-scale project of comparative analysis of WFS surveys (Mason *et al* (1982). These should prove useful for the estimation of within-country multi-level equations.

Limitations of cross-sectional surveys of individuals are well recognized. Related problems of causal modelling may arise from the time-referent of the community-level characteristics. Current conditions may be a poor indicator of the situation existing at the time crucial fertility-related decisions were made. This is seen most easily with regard to the family planning programme. The level of contraceptive use among older women, 40 and over, may depend less on current measures of availability and accessibility than on the situation five to ten years earlier, when these women may first have experienced an 'excess supply'. Stated otherwise, there may have been a different effect from the programme on contraceptive use in two communities which currently are similar on measures of availability but which differ in their past history. If these problems are recognized in the development of the model, it may be possible to obtain reasonable indicators of a macro characteristic for an earlier time from service statistics, censuses, year-books, or other document.

7.7 CONCLUSION

This paper has reviewed the potential and limitations of multi-level analysis with special reference to the

study of contraceptive behaviour. Conceptually this strategy avoids the disjunction between strictly micro and strictly macro analyses, permitting the use of both types of variables in a manner compatible with theoretical frameworks. In particular it reduces the over-reliance on surveys as a source of data that is more properly conceptualized as a group characteristic and more easily measured at the aggregate level.

Several other benefits are associated with using the multi-level strategy for the study of contraceptive behaviour. By its nature it requires close co-operation between researchers and policy-makers to develop appropriate models and identify the salient programme factors which need to be taken into account. This should ensure greater utilization of research results and help reduce the distance between researchers and policy-makers which unfortunately is all too common. By combining community-level programme data with social structural factors and investigating contraceptive behaviour in the broader context of the determinants of fertility, the false dichotomy between family planning programmes and economic development is avoided. At the same time, the multi-level strategy can produce direct guidance to administrators and policy-makers about specific features of their programmes that are more or less successful. The approach can produce insights similar to those derived from experimental design by combining aspects of operations research with careful statistical modelling.

As with other non-experimental methods in the social sciences, multi-level analysis is not a strategy that can be applied mechanically. The development of an appropriate model, with careful attention to the ordering of the micro and macro variables, is a necessary first step. Since the nature of the family planning programme and the social structure can be expected to vary from country to country, it is unlikely that the same set of variables will suffice in different settings. Problems of estimation and data reduction must also be recognized. Nevertheless on balance it would appear that greater utilization of this mode of analysis should pay large dividends, and additional experience should help reduce the existing limitations.

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8 Factors other than Nuptiality and Contraception Affecting Fertility

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8.1 INTRODUCTION

The following five factors affecting fertility are considered in this paper: lactation, both in terms of duration and of type (ie whether full or with a supplement and the frequency of feeding); post-partum sexual abstinence; terminal sexual abstinence; coital frequency; and the relative pressures toward lower fertility outside marriage (ie the extent of the proscription of sexual relations, pregnancies or births except when in a recognized marriage state and as a result of marital relations with the spouse). It might be observed that the measurement of marriage makes little sense unless the final factor listed above is also adequately studied.

The grouping together of these five constraints on fertility makes logical sense especially when the impact of the community is being studied. For most of human history, fertility has very largely been determined by these factors together with pathological constraints on fecundity. This is still true of much of the Third World, especially in Africa and south Asia. The five cultural constraints have been deeply imbedded in religion and in community attitudes to behaviour. Pressures to ensure that the traditions were observed with regard to them did much to determine the position of women in society. The definition of female sexual and maternal behaviour is not only the concern of religions but helps determine their very nature. Necessarily, the whole area, especially its evaluation and measurement, is highly emotive.

The fact that the community is more than the sum of its individual members has been shown clearly by a series of studies of the duration of post-partum sexual abstinence in three areas of Nigeria: Lagos, the metropolis; Ibadan, a large but more traditional city; and Ekiti, a remote rural area (Page and Lesthaeghe 1981, chapters 3, 6, 7, 8 and 9). In each area the duration of abstinence was largely determined by female schooling with around six months' reduction in duration for each increase in education from none to

primary schooling, from primary to secondary schooling, and from secondary schooling to tertiary education. Yet there were also marked differences in behaviour between communities which were not merely differences in educational composition. At each of these four levels of education the duration of abstinence was about six months longer in Ibadan than in Lagos, and a further six months in rural Ekiti. One could pretend to explain this by introducing a quantifiable factor known as urbanization, but this would be only an imprecise proxy for religious and moral changes and the extent to which community morality can be enforced upon individuals. For adequate explanation, as well as successful prediction, the measures would have to be those of morality and its enforcement. It is possible to obtain an indirect measure of moral realities from aggregate measures of individual behaviour. Peer-group models do impose moral pressures and conformity with those models rarely exposes the individual to danger from community sanctions. Nevertheless, if change is to be understood and further change predicted, it will be necessary to study directly the religious and cultural prescriptions for behaviour in these five areas and to understand the nature of cultural change.

Community questionnaires have a value both for itemizing the facilities of a community and for providing certain crude measures of the nature of a community. There may be a relation between the density of family planning service centres and the use of contraception. There is unlikely to be a similar relation between the density of religious buildings and coital frequency. Some quantifiable measures are possible even in these areas. Possible examples are the number of persons indicted in community ceremonies for having strayed from the prescribed paths of righteousness (P. Caldwell and J.C. Caldwell 1981: 85), or the number of killings, suicides or expulsions from the household for detected sexual behaviour outside matrimonial bounds. Accurate measurements of this kind can rarely be obtained from questionnaires or

even from group interviews. However, they can often be assessed by anthropological approaches involving participant observation.

Clearly, we are a long way from being able to relate quantified community and individual data relevant to these five factors. Yet, ironically, community variables probably have a greater influence on these five factors than on other aspects of demographic behaviour. Indeed, community variables are so important as to provide a justification for the unusual approach which will be followed in the rest of this paper. That approach could be described as the attempt to compile an introductory manual to the various approaches needed to secure different types of data and the propositions that could be tested by each approach. Implicit in these propositions is usually a major community involvement. Some of the possible research outlined has as its major thrust the demonstration that the five factors do mould fertility and the extent to which they do so. Finally, it might be noted that the propositional approach that was requested for this paper is not itself without major worries and these are emphasized at the end of the paper.

8.2 DEFINITIONAL AND RESEARCH PROBLEMS

There are problems in defining the institution. Once Yoruba society was characterized by an institution of post-natal sexual abstinence, following a live birth with a surviving child, of three years (or possibly four years for a boy and three years for a girl). Does it now still possess the same institution with a shorter duration or has the institution itself been altered? When institutions were stable in all aspects one could hardly talk of community variables in this regard. It is the changing nature of institutional prescriptions which has more closely tied institutions to community data. During a period of transition, almost the only criterion that can be employed as a measure of moral adherence is that of community norms (meaning typical behaviour rather than edifying aims) in the contemporary period or slightly earlier. Peer-group example is of paramount importance. Clearly, one should be able to measure community behaviour and to conclude what is fairly typical and what is atypical. Even if the measurement can be accurately carried out, there remain two problems. The first is the fact that some communities allow more latitude to typical behaviour than do others. The second is a tendency in some communities to have different normative pressures for different groups. For instance, the Yoruba hold that post-natal sexual abstinence helps to determine the birth interval and hence the chance of child survival.

Nevertheless, they tend to accept a shorter duration for more educated parents on grounds which include a higher level of child care, a better diet for children, and a greater ability to bring help to an ailing child. They are also moving to distinguish between sexual activity accompanied and unaccompanied by contraception.

The above example may hide more than it illustrates. At one level, post-natal sexual abstinence is regarded as a kind of cross between decent and hygienic behaviour. At another, it is thought of as taking proper preventive measures against dangers: the threat of protein malnutrition or of the milk being poisoned by semen. However, there are also religious considerations, such as the expectations of the gods, or moral matters, such as the down-playing of female sexuality. Even in a society where the latter considerations are important, the social scientist is likely to be told first the more materialist explanations, which, because he comes from a secular society, he will eagerly grasp. In rural south India, the religious element, in terms of sexual abstinence and coital frequency, is dwindling for two reasons. First, there has been a move from the worship of local gods, usually obsessed with familial behaviour, to those of the Great Tradition, and, secondly, some forms of behaviour have come to be regarded as secular matters rather than religious ones. The result has not been simply a re-interpretation of institutional demands but also a change in the locus of interpretation, for the older generation are more likely to cede to the younger generation decision-making powers on matters of more ambiguous morality. The whole matter has been confused further by the entrance into the arena of the Indian family planning programme with a state morality regarding conception and contraception.

Institutional pressures exist at three levels: the individual, the family, and the community. When studying religious and moral pressures, social scientists are often likely to concentrate on the overt pressures from outside the individual and give insufficient attention to the person's psychic balance of pressures (even those can be detected and measured to some extent by individual questionnaires). It is well to remember, in terms of religion, that education's impact in India has been largely to secularize (to move some areas of behaviour outside the religious domain) while in sub-Saharan Africa education has often been associated with a formal change from indigenous religions to Christianity and a slower resulting change in beliefs and behavioural patterns. Earlier, other Africans moved to Islam, with perhaps eventual change from years of post-natal sexual abstinence to only 40 days, although this has not yet occurred among the Muslims of southern Nigeria.

The divergence from expected behavioural patterns

with regard to abstinence can lead to bitter accusations even of child murder (greater in contemporary Africa), and, with regard to sexual relations outside marriage, public knowledge can lead in India to female suicide or to the impossibility of marriage, not only for a girl but also for her sisters. In India, unusual levels of coital frequency may cause bitterness in the extended family, and, in both regions, unusually short periods of lactation may result in accusations of complicity in any subsequent child death.

In these circumstances, there are real problems in obtaining accurate data from survey interviews and considerable problems even in the case of more prolonged and intimate contact. When, as in Africa, the risk of the premature resumption of sex is a socially unacceptably early pregnancy or the loss of a child as a consequence of such a pregnancy, retrospective information can be more reliable than the current reporting of sexual activity. Indirect evidence about incidence in populations of post-natal and terminal sexual abstinence, sexual relations outside marriage, and even coital frequency can be provided by pregnancies and births, but this can be distorted by contraception and abortion and is selective when using individual data.

It would seem clear that aggregate data are probably more reliable than community data when seeking evidence on the incidence and duration of these various practices.

However, there are important community data to be gathered in terms of moral beliefs and in terms of communal pressures and control activities. In Africa, divergence from standard behaviour can result in these social crimes being 'sung', either informally during work activities or more formally on such special occasions as the Yam Festival. Professional singers in India, who travel from village to village teaching moral messages, can sometimes serve much the same function (although most of the singing is about general positive virtues). In both societies, gossip is also a form of control. Anthropological-type participant observation can be very valuable for detecting these controls as well as recording scandals and suicides resulting from sexual relations outside marriage. In India, herbalists may provide information on potions provided to remedy excessive coital frequency. Participant observation also allows an investigation of the circumstances surrounding weaning.

Participant observation is much superior when examining community pressures which are exerted directly, as is commonly the case in Africa, than for examining community views which compel quiet but ill pressures within the family, as is more often the case in India.

The duration of abstinence or lactation can vary

dramatically from village to village. This may sometimes be an additional effect over and above that shown to have an impact on individuals from the same cause. Education is perhaps the best example. Yet the level of community education may be an effect as well as a cause. Greater social change or more positive local leadership may have created a politically effective demand for the provision of schools. Alternatively, the greater willingness of families to let their children stay at school may be the product of a whole complex of modernizing changes of which education is more an index than a cause.

Nevertheless, our experience in both Africa and India is that quite dramatic changes in the duration of lactation and abstinence can result from the behaviour or arguments of a few strong-minded natural leaders. Sometimes they argue from religious or other moral revelation. In many cases, such changes are now buried in the past and are not easily disinterred even by the oral tradition.

Much of the work may be done by small prospective studies piggy-backing an additional case study approach. This is particularly so with regard to lactation. The research worker must be careful not to distort the duration of lactation by providing, even upon request, views upon lactation, and must not study the mother or parents so exclusively as to change the decision-making influences usually exerted by the grandparents or other relatives.

The study of how post-natal female sexual abstinence is maintained in Africa often requires a continuing close relationship with a considerable number of families. The observer will have to note the expectation that a wife will call out in the night if her husband should prematurely approach her for sexual relations and also the roles of other members of the household in these circumstances. In India, the control of sleeping arrangements is more important. Yet a great deal of light can be thrown on the punishments which affect behaviour if a study is made of all cases of infant or early child death. Frequently, in Africa, this will be attributed to the early resumption of sexual relations with the result that the parents are literally or actually accused of child murder. In these circumstances, a grandmother can exert her right to take over her grandchildren and to forbid their parents access to them. In India, there are near parallels in the case of wilful and early weaning. On the other hand, women can claim – or believe – that they must wean because their milk is suddenly drying up or because of the 'evil eye' or some other intervention by a malign person.

Except for the evidence from pregnancy, the investigation of sexual activities later in the reproductive span, whether terminal abstinence or low coital

frequencies, depends largely on personal statement. Something can be learnt from sleeping arrangements and from the incidence of grandmaternal pregnancies (both from birth and abortion information). In India, something may also be learnt from worries about sickness said to be due to frequent coitus or to dietary supplements to overcome any imbalance. Data on the age of the mother at the birth of her final child is also indicative.

Although attempts are made to hide non-marital sexual activities, the resulting scandals and disasters are so great that an anthropological type of investigation can yield a great deal of information and much about village pressures (the problem is to prevent the investigation adding to the pressures). Indirect information can also be obtained by investigating difficulties encountered in arranging marriages and the reasons for unexpected apparent misalliances, high marriage payments or subdued or badly attended weddings.

One problem with institutions is that they are forever changing. In India one is usually told what they should be like rather than their contemporary position. Another problem is that institutions vary from place to place. In the one place they vary by social class and, in India, by caste.

Perhaps the basic problem in measuring community effects is not to be misled by a single measure in a much more complex situation. Even the single measure may be proxy for a truer one. In a rural south Indian area we examined a strongly positive relationship between the provision and acceptance of schooling and the demand for fertility control, but the relationship only really made sense when it was seen in the context of reducing farm size and the availability of employment in a distant city where employers gave preference to literates.

What data can or should be collected? The incidence or duration of each of the fertility controls discussed here should be measured at both the individual and community level, largely so that peer-group example and conformity or divergence can be measured and possibly explained. For all but sexual relations outside marriage either aggregation or a light census of the whole community may give usable results. However, the explanation of divergences or differences between communities, or alternatively how peer-group conformity is maintained, can be attempted only by methods beyond the usual survey approach.

Finally, there are problems about defining the community. In India, the community of Brahmins may for many purposes extend far beyond the village, while Harijans may have a community little larger than their own caste group in the village, being denied access to many village facilities.

8.3 NOTES ON TWO SOURCE STUDIES AND THE RESEARCH APPROACH

Most of the discussion of research design and the source of nearly all the propositions will derive from two studies:

- 1 the Nigerian Family Study of 1974–5 (Caldwell and Caldwell 1977 and 1981; P. Caldwell and J.C. Caldwell 1981), although this will be supplemented by experience from the 1962–4 research programme in Ghana (Caldwell 1968), the 1969 programme in Nigeria (Caldwell and Igun 1970), the 1973 Nigerian segment of the Changing African Family Project (Okediji *et al* 1976), and the Changing African Family Project in other countries; and
- 2 the Origins of Demographic Change in South India programme of 1979–83 (Caldwell *et al* 1982).

The Nigerian Family Study began with a considerable period of semi-structured interviews of an anthropological type which were designed so as to improve the principal research instrument. That instrument was a small-scale highly focused survey with open-ended questions and with subsequent revisits by the principal investigators with notebooks in hand. One of two surveys concentrated on women in a five-year age span when terminal abstinence is most likely to begin. The other survey studied a wider range of women, giving most attention to lactation and post-natal sexual abstinence. The statistical framework within which the surveys fitted was provided by a large-scale survey of Ibadan city carried out 18 months earlier during the Nigerian segment of the Changing African Family Project.

In contrast, the 1979–83 programme in south India has experimented with a wide range of methodologies. The village work has always begun with a rather detailed census survey preceded by mapping and followed by more detailed ecological mapping drawing on census-survey material. Periodic vital surveys are carried out and these are matched with the continuous updating of the household census which provides a kind of continuous registration. Nevertheless, most of the propositions listed below emerged from very different types of approach. From four periods of residence in the major village we have carried out studies by participant observation from which the ideas for many of our probing questions are generated. Inevitably, one's notebooks become filled with all the material found in community questionnaires and much else as well. With a team of assistants we have built files on all households by repeated visits, sometimes talking with individuals and sometimes

with groups, often of shifting composition. The latter have turned out to be of surprising value especially when building up a picture of change over time and of reasons for change. We have devoted much more attention than had at first been anticipated to work with old people. Where we have not been present at interviews, we hold long de-briefing discussions with our assistants every night on the day's events and this is a fertile forcing ground for testable propositions. However, the most valuable approach when seeking to break new ground is the long, probing interview by the principal investigators, which has proven so useful largely because they have sufficient background knowledge and bear sufficient intellectual responsibility for the project to be able to open up new areas of enquiry in a flexible way from such small beginnings as a chance remark. The work places much emphasis on the reasons for behaviour, the conditions of change, the blow-by-blow history of decision-making, and also on the conditions which preceded change. The analytical approach to the files is largely that of anthropologists, whereby existing hypotheses, or alternatively ones generated during the research, are tested against the growing body of information in order to discard, provisionally confirm or modify them. Although we had intended this to be an almost exclusive approach, we have increasingly supplemented it with highly focused small surveys of the type employed in the Nigerian Family Study. We have done this whenever the anthropological approach has illuminated a particular area and when we believed there would be benefit from securing a full range of quantitative material to provide ecological patterns and to allow the establishment of statistically significant associations between measures for individuals or families. In many areas, such as marriage or weaning, we have moved toward adopting a case study approach, and this has proved particularly valuable when unravelling the history of decision-making. Confirmatory material is often sought from outside the project. For instance, after certain aspects of the position a generation ago appear to have been established, we tend to seek confirmation in archival material, historical records and contemporary accounts. We are considering the value of a final large-scale quantitative survey, but it should be emphasized that we would not regard the significant associations so established as the only form of proof. In many ways, we regard the interlocking information from the intensive anthropological work as evidence in its own right and not merely as the source of hypotheses.

Perhaps two specific observations should be singled out. The first is that the anthropological data have been employed to test the initial census-survey

responses. This approach shows that the hard data (age, marital status and number of living children – but not the number of dead children) are little improved. However, there is clear evidence that not only the attitudinal data, but also those on the behavioural sequence of events as recorded by the census-survey, were of almost no value. That can be illustrated by our second observation. We originally concentrated much of the research on the decision-making leading to the acceptance of sterilizing operations by the government family planning programme. The decision-making process turned out to be complex, to involve a number of considerations, and usually to involve a series of complex interactions between different relatives. Only part of this story was known to the young woman who was eventually tubectomized (indeed much was not known to the head of the family). Her responses to the survey were truthful but handicapped by neither knowing of the first discussions nor usually being expected to understand or have an opinion about the matters of family economics involved. Indeed her responses to the survey usually concentrated on her final acceptance of the implications of family pressures, thus giving the impression that such decisions are rapid and tend to be made by the women being sterilized. Even were a survey to have separate sections for interviewing all those involved, the whole story probably could not be teased out and it is unlikely that it could be put together in the office in the correct sequence.

Finally, two points might be emphasized again. Community residence and an anthropological or case study approach quickly lead the researcher to wonder how closely survey research can ever approach the truth in the case of many of the matters raised in this paper. The two advantages of a more anthropological approach that become ever more apparent are the following. First, every problem seems to need hundreds of answers to focus in on the truth and surveys can ill afford such a density. Often, survey answers which seemed different turn out to be merely different aspects of the same complex response: indeed surveys appear to artificially generate a range of answers in matters where there is a community consensus. Secondly, it appears ever clearer to the researcher that the same person, the principal investigator, needs to assume intellectual responsibility at every stage of the investigation for bringing in new questions, supplementing the thrust of the investigation, sorting the data and analysing it. Where different persons do this misunderstandings can be very great, and the knowledge of persons can be lost to the analysis.

We shall now turn to the specific areas given to us. We would like to emphasize at the outset our continu-

ing apprehension at presenting a series of propositions rather than attempting the identification of areas of interest to be explored. The initial listing of hypotheses underestimates the value of the micro-approach studies which have generated them and almost inevitably leads to a tendency to grade the propositions in order by the ease and satisfactoriness with which they could be tested by an orthodox survey.

The grouping together of lactation practices, post-natal female sexual abstinence, terminal female sexual abstinence, coital frequency and the social context of lower fertility outside marriage than within is more satisfactory than might seem at first sight. This point is discussed at length in the concluding section of the paper, but it should be noted here that these practices have for most of human history constituted the near totality of fertility control. For instance, until the 1960s contraceptive fertility control was negligible among the Yoruba of Nigeria (Caldwell and Ware 1977). Even in Ibadan city, the reason that women gave birth to on average only 6 instead of 15 children during their lives was explained in the following ways: amenorrhoea beyond the biological minimum induced by lactation of around two years – a reduction of 4.2 births (or 47 per cent of all reduction); post-natal female sexual abstinence preventing conception beyond the resumption of menses – 2.4 births (27 per cent); terminal female sexual abstinence – 0.4 births (4 per cent); and lower fertility arising from not being currently married – 2.0 births (22 per cent) (Caldwell and Caldwell 1977). At the beginning of the century, when post-natal sexual abstinence was longer, terminal abstinence more universally observed and commenced earlier (because marriages and hence grandmaternity occurred at younger ages), marriage occurred around menarche and the pre-menopausal remarriage of widows exhibited few exceptions, these reductions were probably of the following order: lactation – 39 per cent; post-natal sexual abstinence – 44 per cent; terminal sexual abstinence – 9 per cent; lower fertility during the period outside marriage – 8 per cent. Then, as now (although decisions about weaning are rapidly becoming secularized) such female behaviour lay in the realms of religion and morality and hence were the concern of older relatives and of the whole community.

8.4 LACTATION PRACTICES

It is important to explore several areas: (A) the nature of lactation practices; (B) the conditions of weaning and the decision-making mechanisms leading to weaning; and (C) the nature and conditions of change. The

following propositions are drawn mostly from both Indian and African work and are marked in brackets as (I) largely India, (A) largely Africa, and (B) both. Some of the propositions are expressed in the words of the people involved and not of the researchers. Some propositions are almost certainly not true but have been suggested at some time by a researcher.

It should be noted that there has been more research on the duration of lactation and its relation to the duration of amenorrhoea than the nature of lactation, weaning decision-making and related changes in the duration of lactation. The evidence to date appears to show that in the Third World the duration of amenorrhoea is around two-thirds of that of lactation, whilst the fraction may be only one-third in industrialized countries (Population Information Program 1981: 538–9). This comparison suggests that nutrition plays a significant role but the findings from within single countries are by no means conclusive (Mosley 1979: 99)¹ and the style of breastfeeding may be important. Because, in the absence of breastfeeding, around 90 per cent of women resume menstruation within few months of the birth (Population Information Program 1981: 539), the duration of lactation in non-contracepting societies is a major control of fertility and the difference between weaning at 12 and 24 months may account over a marital reproductive lifetime for a difference of two births in the completed family size (Lesthaeghe *et al* 1981: 11) or more than 10 crude birth rate points.

A The nature of lactation practices

- 1 Supplementation does not necessarily increase with time and may not indicate the approach of weaning (A). (Supplementation almost from the beginning is widespread in Africa to develop in the child certain characteristics; the early supplementary foods bear little relation to weaning food.)
- 2 The duration of amenorrhoea may be affected by the fact of supplementation, the timing of its commencement, its volume and its frequency.
- 3 The period of amenorrhoea is affected by the fact of lactation, its volume, its frequency, the maximum gaps during a 24-hour period, and by its duration.
- 4 The nature of breastfeeding and the nature of supplementation cannot be analysed separately because of interactions.
- 5 Prolonged lactation is rarely carried out mainly for its effect on preventing conception although many societies believe that it enhances the survival of the child or the next child and some see this enhance-

¹However, see Frisch and McArthur (1974).

ment in terms of the duration of the birth interval (B).

- 6 Sexual relations are dangerous during lactation (although the danger may lessen with time (I)) either because semen poisons the milk or because sexual heat or excitement affects the milk or is transmitted to the baby (B).
- 7 Lactation provides the best food source or the cheapest food or the most certain food if faced with periods of scarcity (I).
- 8 Lactation protects the babies from illness (B).
- 9 Lactation leads to greater childspacing and this is good for the health of both children and mothers (B).

B The conditions of weaning and the decision-making mechanisms leading to weaning

- 1 In many societies there was not until recent times a problem of weaning decision-making because weaning was determined either by the fact of the next pregnancy or by the diminution or extinction of milk supply (I).
- 2 The decision as to when to wean has not always been a purely secular decision but there have been religious and moral aspects (B).
- 3 Accordingly, such guardians of traditional morality as mothers-in-law and others have often played a role (B).
- 4 Maternal education is inversely related to the duration of breastfeeding (B) (Caldwell and McDonald 1981: 91-2).
- 5 The mother's employment outside the home, especially in the modern sector, is inversely related to the duration of breastfeeding (A).
- 6 At any given time in a society, there are concepts about the proper duration of lactation (B).
- 7 Weaning is often later for boys than girls either because of (a) greater concern about the possibility of a male death or (b) greater concern to increase the mother-son bond or (c) due to a belief that girls are stronger (B).
- 8 Weaning may occur earlier at some times during the year than at others because of the need for female labour such as at the time of the harvest (I).

C The nature and conditions of change

- 1 With a movement of weaning decisions from the religious and moral domain to the secular one, there has been a tendency for the mother to become more important in the decision-making process (I).
- 2 As something of a sexual revolution occurs, the

believed link between sexual relations and the condition of the milk can lead to earlier weaning or wet nursing or the adoption of coitus interruptus or a growing scepticism about the belief (sometimes with growing inter-generational tensions) (B).

- 3 With social change, and particularly education, the focus of concern for longer lactation and child-spacing increasingly encompasses the survival and health of the mother as well as the child (B).
- 4 Similar changes also lead to the diminution or disappearance of the differential by sex in the duration of weaning (I).
- 5 The duration of lactation may decline as food becomes more plentiful and as food shortages become rarer (I).
- 6 Lactation may decline as the opinions or doctors or health personnel become known either at the personal level or through the media (B).
- 7 The same may be true with regard to the advertisement of baby health foods or feeding bottles or as these become more available (A).
- 8 The period of breastfeeding may decline as women begin to wear clothing or different clothing on the upper body, or become more conscious of the sensitivity of their nipples to pain, or of breastfeeding in public or the shape of their breasts (A).

These propositions underemphasize some of the most important areas to be explored. One example is the whole context of the weaning decision. Who plays a role? What beliefs do they hold and what arguments do they use? What rights do they have to intervene? Do they intervene partly because their failure to do so would reduce their authority in other matters? What is the final determinant of the exact time of weaning? What role is played by changes among peers? Do new ideologies about breastfeeding sweep fairly rapidly through a society? Has the propagation of the family planning message had implications for views on breastfeeding? Do family planning workers transmit views on breastfeeding? What inter-relation is there between oral contraception and breastfeeding either biologically or because of beliefs by the public or medical personnel about inter-relations.

The propositions have not emphasized the need to continue work on the determination of the duration and nature of breastfeeding and to relate it to the duration of amenorrhoea for individuals and societies under different conditions.

Just how one tests these propositions depends on how finely tuned the planned research approach will be or on the emphasis to be placed on establishing the associations between large numbers of cases. Table 8.1 attempts a rough answer.

Table 8.1 Research approaches required to test the lactation propositions

Proposition	Appropriate research approach				
	Orthodox large-scale survey	Large-scale survey with much attention to detailed and careful collection of data on specific matters	Case studies and highly focused small-scale surveys	Anthropological approach	Local studies collecting historical data and retrospective information especially from the aged
A (1)		x	x		
(2)		x	x		
(3)		x	x		
(4)			x		
(5)			x	x	
(6)			x	x	
(7)			x	x	
(8)			x	x	
(9)	x (testing reality)		x	x (testing beliefs)	
B (1)			x	x	
(2)			x	x	
(3)			x	x	
(4)	x				
(5)	x				
(6)		x	x	x	
(7)	x (testing fact)		x	x (testing reasons)	
(8)		x	x		
C (1)		x	x	x	
(2)		x	x	x	
(3)		x	x		
(4)		x	x		
(5)					x
(6)					x
(7)					x
(8)					x
The decision-making mechanisms			x	x	

8.5 POST-NATAL FEMALE SEXUAL ABSTINENCE

The propositions with regard to post-natal sexual abstinence will also be divided into: (A) the nature of post-natal sexual abstinence; (B) decision-making and conditions of cessation; (C) the nature of change.

Research by demographers on post-natal sexual

abstinence is relatively recent, a salutary warning against employing standardized international methods. Most work has been carried out in sub-Saharan Africa where it is probably most widespread and where it is the major control of fertility (Caldwell and Caldwell 1977) (in that it frequently extends beyond lactation-induced amenorrhoea, thus causing the latter to have no impact, but the matter is more complex than this in

that the period of lactation may determine the period of abstinence,² and in that the period of amenorrhoea conversely means that abstinence has no effect at this time on fertility). Early work was unable to prove the link between the duration of post-natal sexual abstinence and reduced fertility (or the practice of polygyny) because of the scarcity of studies, but models (Lesthaeghe *et al* 1981: 11) suggest that for illiterate Yoruba couples the average amenorrhoea of 18 months, lactation of 24 months and post-natal female sexual abstinence of 30 months,³ probably reduce completed family size by about two children. Demographic work on the subject has also been carried out in Indonesia (Singarimbun and Manning 1976; Hull 1978) and India (Caldwell *et al* 1982) and it is known that the practice is followed by Amerindians. The duration of post-natal sexual abstinence has been greatly reduced in rural south India over the last 30 or 40 years as appears to have happened in some areas of sub-Saharan Africa.

One worry remains with regard to post-natal sexual abstinence. We have not considered considerable periods of abstinence which are neither post-natal nor terminal, regarding such behaviour as being dealt with under the heading of contraception. Yet the practice of post-natal and terminal abstinence must make a society regard all abstinence as rather normal and there is evidence among the Yoruba that the practice of abstinence during the prescribed times leads to its more frequent employment at other times.

A The nature of post-natal sexual abstinence

- 1 Post-natal sexual abstinence is practised to prolong the birth interval and so to preserve the health and encourage the survival of both the present and the next child and, to a lesser extent, the health and survival of the mother (B).
- 2 Post-natal sexual abstinence is practised to protect the milk from poisoning or adulteration by the semen (B).
- 3 The sanctions for abstinence run the full gamut from the religious to health and matters of hygiene, with health and hygiene more likely to be revealed in the short survey interview (B).
- 4 Long periods of sexual abstinence are more likely to

be practised in dietary conditions which predispose infants and children to protein malnutrition (A).

- 5 Post-natal sexual abstinence is more likely to be practised in a society characterized either by polygynous marriage or by beliefs that males physically and spiritually benefit from periods of abstinence (B).
- 6 Sexual abstinence is likely to be of the same duration or longer than lactation in societies with a belief that semen is more poisonous either to the milk or the child during the earlier period of infancy than later (B).
- 7 Post-natal sexual abstinence is likely to be shorter in matrilineal than in patrilineal societies (A).
- 8 Post-natal sexual abstinence is more common in societies practising not only polygyny but also clitoridectomy and paying brideprice (A).
- 9 Post-natal sexual abstinence is more common in societies where women play the major role in agriculture (A, I?).
- 10 Post-natal sexual abstinence is more common in societies where widow remarriage is encouraged (A).
- 11 The duration of post-natal sexual abstinence is longer where post-natal spousal residential separation is practised (A).
- 12 Post-natal sexual abstinence is related to the suppression of female sexuality and is a mechanism for achieving it (B).
- 13 Women who practise long periods of post-natal sexual abstinence are more likely to practise both terminal abstinence and also sexual abstinence when not specifically socially prescribed.

B Conditions of cessation of sexual abstinence and related decision-making

- 1 Family sanctions and family intervention help to police abstinence (B).
- 2 Where the couple do not live in a larger family this is achieved either by the separation of the couple or by the mother or mother-in-law moving to the couple's house. Community sanctions, including accusations of child murder, are practised to maintain the institution (A).
- 3 Post-natal sexual abstinence is more easily policed in gerontocratic societies where women are considered outsiders (A).
- 4 Cessation usually takes place only if the husband takes the initiative and if the wife subsequently agrees (A).
- 5 The premature cessation of abstinence is more easily achieved after weaning than before (A).

² Amongst the Yoruba of Nigeria, abstinence traditionally extended six months beyond weaning (cf P. Caldwell and J.C. Caldwell 1981).

³ Lactation and abstinence data from P. Caldwell and J.C. Caldwell 1981.

C The nature of change

- 1 Among the more educated and modernized there is a gradually increasing emphasis on the health of the mother relative to that of the health of the child (B).
- 2 Among these groups there may also appear the concept of female sexual frustration during abstinence in addition to that of males (A).
- 3 Among these groups the older generation may begin to cede the control of abstinence to the younger generation (B).
- 4 Among these groups a reliance on contraception as an alternative method of birthspacing may speed the decline in duration of abstinence (A).
- 5 The use of contraception as a substitute for abstinence may lead to its employment at other times (A).
- 6 In recent decades abstinence has declined with education and urban life and, among all groups, over time (B).
- 7 The intervening mechanism between greater education and a lesser duration of post-natal sexual abstinence is an increase in the sexuality of wives and in husband's sexuality towards wives (B).
- 8 Even when sexual abstinence has been reduced quite rapidly there often appears to be a minimum period of abstinence (eg six months) which is not easily reduced (B).
- 9 In societies which have practised post-natal sexual abstinence it is rare to reduce the period of abstinence to a shorter duration than that of amenorrhoea. Often such societies forbid sexual relations during periods of amenorrhoea or after menopause (sometimes believing that the function of menstrual bleeding is to wash out semen) (B).

In addition there is a need for research on decision-making mechanisms both between husband and wife and within the larger family. There is also a need to examine the age-specific fertility of those who only abstain, of those who substitute contraception for part of the abstinence period only, and for those who substitute contraception but then practise it more generally.

Table 8.2 details the test approaches.

8.6 TERMINAL FEMALE SEXUAL ABSTINENCE

Terminal sexual abstinence is probably practised throughout the world to a greater extent than post-natal sexual abstinence. When it is pre-menopausal (and hence may influence fertility) the most common reason given is that of becoming a grandmother, often justified by the conflicting duties of mother and grand-

mother. Other explanations include the problems of having sexual relations when there are adult children, becoming too old for sex, and becoming too old to easily survive a birth or to rear children. Another reason quoted is that a family of adequate size (often four living children) has been established. There is a concept of a social menopause. It is likely that in most traditional societies nearly all females practised abstinence once they reached menopause. The evidence amongst the Yoruba of Nigeria is that 50 years ago, when the modal age for becoming a grandmother was 35 or 36 years, and when terminal abstinence was nearly universally practised, it may have accounted for around one-tenth of all fertility control and have reduced family size by about one child.

The propositions are more limited in number.

- 1 Terminal abstinence is practised so that maternal and grandmaternal roles will not conflict and hence commences at the birth of the first grandchild or sometimes at the marriage of the first child or alternatively the first son (B).
- 2 Terminal abstinence begins in some societies with menopause either because of a belief that sexuality is identical with the ability to reproduce or because of a belief that menstrual bleeding is necessary to flush out semen (B).
- 3 In both cases, but especially the latter, the observation of terminal abstinence is controlled by concepts of purity and hygiene which have, or at least had in the past, something of a religious context (B).
- 4 Terminal abstinence declines with education, especially of the wife, and with other indices of modernization (B).
- 5 Terminal abstinence is more likely to be practised in a society characterized by polygyny or by the concept that older males should give up sexual relations so as to achieve both health and spiritual benefits (B).

In addition, research is needed on the decision-making mechanisms involved.

8.7 COITAL FREQUENCY

Studies in India reveal coital frequencies among Hindus (but not Muslims) (Nag 1972: 235; Gould 1972) so low at older ages (for wives over 30 years) that fertility must be affected even though occasional sexual relations mean that terminal abstinence is not reported in surveys. It is not clear how widespread such behaviour is outside India, and a survey in Bangladesh did

Table 8.2 Research approaches required to test the post-natal sexual abstinence propositions

Proposition	Appropriate research approach					Case studies and highly focused small-scale surveys	Anthropological approach	Local studies collecting historical data and retrospective information especially from the aged
	Orthodox large-scale survey	Orthodox large-scale survey in several countries or regions	Large-scale survey with much attention to detailed and careful collection of data on specific matters					
A	(1)			x		x		
	(2)			x		x		
	(3)					x		
	(4)		x	x				
	(5)		x					
	(6)		x					
	(7)		x					
	(8)		x					
	(9)		x					
	(10)		x					
	(11)		x					
	(12)		x					
B	(1)					x	x	
	(2)					x	x	
	(3)						x	
	(4)		x				x	
	(5)						x	
C	(1)					x		
	(2)			x		x	x	
	(3)					x	x	
	(4)	x		x		x		
	(5)	x				x		
	(6)	x				x		
	(7)		x				x	x
	(8)			x		x	x	
	(9)					x		
Decision-making								x
Age-specific fertility	x						x	x

not find the same pronounced phenomenon among the Hindu minority there (Ruzicka and Bhatia 1982).

The following are propositions with regard to coital frequency.

- 1 In the absence of subfecundity or contraception, fertility rates decline with coital frequency.
- 2 Coital frequency declines with age.
- 3 In some Third World societies coital frequencies in the latter part of the female reproductive span are often so low as to approximate abstinence but are not detected by surveys which specify terminal abstinence (I).
- 4 Coital frequency may be controlled in extended households by accommodation problems, sleeping arrangements and moral pressures (I).
- 5 One reason in extended households for the control of coital frequencies is the necessity felt to reduce the sexuality of daughters-in-law either for reasons of purity or to prevent the growth of too strong an emotional bond between her and her husband (I).
- 6 There may be less pressure on the young couple to reduce coital frequencies before the birth of the first child or the first son (I).
- 7 Coital frequencies are often low or non-existent during pregnancy and menstruation (B).
- 8 Sexual relations may not take place during such taboo periods as religious ceremonies or after family deaths (B).
- 9 Coital frequencies may become very low when there are older children, especially adult children living in the same house, largely because of concepts of the mother's purity (B).
- 10 In some societies there are very different levels of coital frequency in the case of different wives in a polygynous marriage (A), but some societies (eg Muslim societies) attempt to equalize coital frequency.

8.8 ILLEGITIMATE FERTILITY

Nuptiality would not be a significant factor affecting fertility if many societies did not have very strong pressures for sexual abstinence or much lower coital frequencies outside marriage. In fact, most societies do have such pressures. Only in certain tropical American societies does marital status seem to have little effect on fertility while, in contrast, its impact in some Arab and south Asian societies is almost absolute (P. Caldwell 1977). In most societies, non-marital female fertility, as measured in terms of those at risk, is between 10 and 40 per cent of that of currently married women. As age-specific non-marital fertility rises with age in most

societies, non-marital fertility rates are lower relative to marital fertility rates in the potentially most fertile age range.⁴ In most societies there is higher mortality among children born outside marriage than within and, in many, the mortality of their mothers is also unusually high (a measure of family and community pressures). The following are some propositions which are reinforced by research in Africa and India but are derived from wider experience.

- 1 Prohibitions against sexual relations among the unmarried are controlled by morality and religion.
- 2 Such controls are usually stronger over female sexual relations than over male sexual relations.
- 3 There are also separate prohibitions against conception and against birth which in many societies are stronger than the prohibition on sexual relations.
- 4 Sexual relations outside marriage and illegitimate fertility are controlled by the family, the community and sometimes by the law.
- 5 Non-marital sexual relations, and especially illegitimate fertility, are controlled by the adverse effect on the person, especially a female, in terms of the resultant impact on her life, her chances of marriage, the chances of her siblings marrying, the social effect on her family, and possibly the lifelong effects on the child, both socially and legally.
- 6 The prohibition of such relations leads in some societies to the killing of the woman and in others to a high rate of suicide.
- 7 Non-marital fertility rates are lower than marital fertility rates, although there may be differentials between the never-married, the widowed, the divorced and the separated.

8.9 MEASURABLE IMPACTS ON FERTILITY AND THE NECESSARY DATA

All the propositions are related to phenomena that have a bearing on fertility, but much of it is not direct, relating instead to the social context and to decision-making mechanisms. Table 8.4 attempts to cull from the propositions those where direct effects on fertility might be measurable or where practices which will almost inevitably affect fertility are measurable. The lactation and post-natal sexual abstinence periods are

⁴These data are from Carlson (1982); see more widely Rotberg and Rabb (1980).

Table 8.3 Research approaches necessary to test the propositions with regard to terminal abstinence, coital frequency and illegitimate fertility

Proposition	Appropriate research approach					
	Orthodox large-scale survey	Orthodox large-scale survey in several countries or regions	Large-scale survey with much attention to detailed and careful collection of data on specific matters	Case studies and highly focused small-scale surveys	Anthropological approach	Local studies collecting historical data and retrospective information especially from the aged
Terminal abstinence:	(1) x			x	x	
	(2) x			x	x	
	(3)			x	x	
	(4) x		x			x
	(5)	x				
Coital frequency:	(1)		x			
	(2)		x			
	(3)		x	x	x	
	(4)		x	x	x	
	(5)		x		x	
	(6)		x	x	x	
	(7)		x	x	x	
	(8)		x		x	
	(9)		x		x	
	(10)		x		x	
Illegitimate fertility:	(1)				x	
	(2)		x	x	x	
	(3)				x	
	(4)				x	x
	(5)				x	
	(6)			x	x	
	(7)		x		x	

Table 8.4 Analytical investigations and the necessary data

Topic	Proposition	Primary factor	Data	Other factors	Data
Lactation	The period of amenorrhoea is shorter where supplementation occurs and is affected by the earliness and volume of supplementation	Amenorrhoea	Dates of birth and of resumption of menses	Supplementation	(1) Date supplementation begins (2) Volume of supplementation at different periods
	The period of amenorrhoea is affected by the frequency of breastfeeding	Amenorrhoea	Dates of birth and resumption of menses	Breastfeeding frequency	(1) No. of times breastfeeding occurs in 24-hour period
	The period of amenorrhoea is affected by the longest period between breast-feeding during the day	Amenorrhoea	Dates of birth and of resumption of menses	Times of breastfeeding	(1) Longest period during each 24 hours between breastfeeding
	The period of amenorrhoea is affected by the woman's nutritional status	Amenorrhoea	Dates of birth and of resumption of menses	Woman's nutritional status	(1) Measurements of nutritional status
	Child mortality is inversely related to the interval between births	Interval between two births	Successive dates of birth for each closed interval	Infant and child mortality	${}_1q_0$ (plus possibly ${}_2q_0$ or ${}_3q_0$) for births on each side of the interval
	Early weaning means a shorter birth interval	Lactation	Dates of birth and weaning	Birth interval	Dates of birth and succeeding birth
	The extended family influences the period of lactation	Lactation	Dates of birth and weaning	Residential family structure	(1) Residential census (2) Possibly census of residence and of adjacent relatives
	The period of lactation is affected by the couple's education	Lactation	Dates of birth and weaning	Education	(1) Wife's education (2) Husband's education
	The period of lactation is affected by whether the woman works outside the house or not, and especially by whether she works in modern sector	Lactation	Dates of birth and weaning	Woman's occupation	(1) Whether she works outside the house and no. of hours per week (2) Whether she works for wages (3) Whether she works in the modern sector with fixed hours and working conditions

Table 8.4 (cont)

Topic	Proposition	Primary factor	Data	Other factors	Data
Lactation	The period of lactation is affected by measures of modernization other than wife's education and occupation	Lactation	Dates of birth and weaning	Various measures of modernization	Examples: (1) Husband's occupation (2) Family income (3) Residential area (4) Exposure to media (5) Urban-rural residence (6) Urban-rural residence during childhood (7) Parental characteristics during childhood (1) Sex of child
	The period of lactation is affected by the sex of the child	Lactation	Dates of birth and weaning	Sex of child	(1) Sex of child
	The period of lactation is affected by previous child mortality	Lactation	Dates of birth and weaning	Previous mortality of children	(1) Whether any children have died and which ones (2) Fraction of children dead
	The period of lactation may have a seasonal element (eg weaning may be earlier if harvesting is approaching)	Lactation	Dates of birth and weaning	Time of weaning	(1) Weaning month
	The period of lactation is affected by whether or not either of the spouses' parents take part in the weaning decision-making	Lactation	Dates of birth and weaning	Structure of weaning	(1) Persons by relationship who played roles in the decision about the timing of weaning
	The period of lactation is affected by the woman's (or couple's) religiosity or moral outlook	Lactation	Dates of birth and weaning	Religiosity and morality	(1) Religion (2) Measures of religiosity (3) Measures of moral outlook
	Where abstinence is not practised, weaning may be later when coitus interruptus or the condom are employed so that the milk will not be polluted	Lactation	Dates of birth and weaning	Use of coitus interruptus or condoms	(1) Whether contraception employed and type of contraception immediately after weaning

Table 8.4 (cont)

Topic	Proposition	Primary factor	Data	Other factors	Data
Lactation <i>cont</i>	The period of lactation is longer when women's health has been affected by childbirth	Lactation	Dates of birth and weaning	Woman's health experience during earlier childbirths	(1) Data on woman's childbirth experience
Post-natal sexual abstinence	Where post-natal sexual abstinence is practised, the period is usually equal to that of lactation or to that period plus a fixed addition period	Period of post-natal sexual experience	Date of birth and date of resumption of sexual relations	Period of lactation	Date of birth and date of weaning
	The period of post-natal sexual abstinence affects the level of child mortality of both the current and the following child	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Child mortality	Date of death (if dead) of child whose birth led to abstinence and of the next child
	The period of post-natal sexual abstinence is affected by religious or moral views	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Religion and morality	(1) Religion (2) Measures of religiosity (3) Measures of moral views or behaviour
	The period of amenorrhoea directly affects the period of post-natal sexual abstinence (rather than through lactation)	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Period of amenorrhoea	(1) Date of birth (2) Date of resumption of menses
	The period of post-natal sexual abstinence is affected by the education of either spouse or by other indices of modernization	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Indices of modernization	(1) Education of woman (2) Education of husband (3) Whether woman works (a) for wages, (b) in modern sector (4) Family income (5) Area of residence (6) Rural-urban residence (7) Rural-urban origin
	The period of post-natal sexual abstinence is affected by previous experience of child loss	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Previous child morality	(1) Whether any children have died (2) No. of children who have died

Table 8.4 *cont.*

Topic	Proposition	Primary factor	Data	Other factors	Data
Post-natal sexual abstinence <i>cont.</i>	The period of post-natal sexual abstinence is affected by diet	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Diet	(1) Community diet (major foodstuffs) (2) Family diet relative to other families
	The period of post-natal abstinence is affected by the availability of child health care	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Child health care	(1) Availability of health service (2) Family use of health service for children
	The period of post-natal sexual abstinence is affected by polygynous marriage	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Nature of marriage	(1) Monogamous/polygynous (2) If polygynous, order among wives
	The period of post-natal sexual abstinence differs between matrilineal and patrilineal societies	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Nature of society	(1) Matrilineal/patrilineal
	The period of post-natal sexual abstinence is affected by the extent of separation of the spouses after birth	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Spousal separation after birth	(1) Whether separation occurs (2) Duration of separation
	The period of post-natal sexual abstinence is affected by the residential family structure	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Residential family	(1) Residential census
	The period of post-natal sexual abstinence is affected by whether either or both spouses' mothers come to stay after the birth	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Presence of spouses' mothers after birth	(1) Presence of mothers (2) Duration of stay
	The period of post-natal sexual abstinence is affected by domestic sleeping arrangements	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Domestic sleeping arrangements	(1) Whether spouses usually sleep in the same bedroom or with others (2) Whether sleeping arrangements change after birth
	The period of post-natal sexual abstinence is affected by the use of contraception	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Use of contraception	(1) Contraceptive use by period after birth (2) Contraceptive use at other times

Table 8.4 (cont)

Topic	Proposition	Primary factor	Data	Other factors	Data
Post-natal sexual abstinence <i>cont</i>	The period of post-natal sexual abstinence is affected by the usual level of coital frequency within the marriage	Period of post-natal sexual abstinence	Date of birth and date of resumption of sexual relations	Level of coital frequency during period before pregnancy	(1) Coital frequencies per time period outside proscribed periods
Terminal female sexual abstinence	Terminal abstinence is more likely to be practised by grandmothers	Practice of terminal abstinence	Date of final sexual activity	Grandmaternal status	Date of birth of: (1) first grandchild (2) first grandson (3) first surviving grandchild
	Terminal abstinence is more likely to be practised by women of higher parity (especially when controlled by age)	Practice of terminal abstinence	Date of final sexual activity	Parity	(1) Date of birth of each child (2) Date of death of each child (3) Date of birth of woman
	Terminal abstinence is more likely to be practised by women with adult children living in, or adjacent to, their residence	Practice of terminal abstinence	Date of final sexual activity	Adulthood of surviving children living with or near couple	(1) Dates of birth of children (2) Dates of death of children (3) Residence of children
	Terminal abstinence is more likely to be practised by women with either a married child or a married son	Practice of terminal abstinence	Date of final sexual activity	Marital status of children	(1) Dates of marriage of children (2) Sex of children
	Terminal abstinence, if it does not begin earlier, is likely to begin at menopause	Practice of terminal abstinence	Date of final sexual activity	Onset of menopause	(1) Date when menopause began
	Terminal abstinence is more likely to be practised by the religious or deeply moral	Practice of terminal abstinence	Date of final sexual activity	Religious status	(1) Attendance at religious ceremonies (2) Religiosity (3) Moral views (4) Moral behaviour
	Terminal abstinence is less likely to be practised by more educated women or couples or by those who score high on other indices of modernization	Practice of terminal abstinence	Date of final sexual activity	Educational status and status with regard to modernization indices	(1) Education of woman (2) Education of husband (3) Occupation of woman (4) Occupation of husband (5) Family income (6) Residential area

Table 8.4 (cont)

Topic	Proposition	Primary factor	Data	Other factors	Data
Terminal female sexual abstinence <i>cont</i>	Terminal abstinence is more likely to be practised in polygynous marriages	Practice of terminal abstinence	Date of final sexual activity	Nature of marriage	(1) No. of co-wives and dates of marriage (full marital history of husband)
Coital frequency	Fertility declines with coital frequency in the absence of subfecundity	Coital frequency	Sexual relations per time period	Fertility	(1) Recent fertility (2) Age (3) Fecundity status
	Coital frequency declines with age	Coital frequency	Sexual relations per time period	Age	(1) Age of woman (2) Age of husband
	Coital frequency is lower in extended families	Coital frequency	Sexual relations per time period	Family structure	(1) Residential census
	Coital frequency is lower when the couple do not normally sleep together or when they do not normally sleep alone	Coital frequency	Sexual relations per time period	Sleeping arrangements	(1) Sleeping arrangements by room (2) No. of persons by age, sex and relationship in room
	Coital frequency declines with the number of births, holding age and marriage duration constant	Coital frequency	Sexual relations per time period	Parity	(1) Parity (2) Surviving children (3) Age of wife and husband (4) Date of marriage (1) Pregnancy and birth history
Coital frequency declines when older children remain in the house	Coital frequency declines after the first pregnancy or after the birth of the first son	Coital frequency	Sexual relations per time period	Whether first pregnancy has occurred or whether first son has been born	Residential census by sex, age and relationship
	Coital frequency declines when older children remain in the house	Coital frequency	Sexual relations per time period	Whether older children in house	
	Coital frequency is lower for at least some wives in a polygynous marriage	Coital frequency	Sexual relations per time period	Polygynous status	(1) Data on coital frequency of women in both monogamous and polygynous marriages and especially (but not necessarily) for co-wives in polygynous marriages

Table 8.4 (cont)

Topic	Proposition	Primary factor	Data	Other factors	Data
Illegitimate fertility and sexual relations	Non-marital fertility is lower than marital fertility	Marital status	Date of change of marital status	Fertility	(1) Dates of births (2) Age of woman
	Non-marital fertility is lower among the more religious or moral	Marital status	Date of change of marital status	Fertility and religious status	(1) Dates of births (2) Age of woman (3) Religious observations (4) Religiosity (5) Measures of morality
	Non-marital fertility is affected by education and other indices of modernization	Marital status	Date of change of marital status	Education and other indices of modernization	(1) Dates of births (2) Age of woman (3) Education of woman (4) Education of husband (5) Occupation of woman (6) Occupation of husband (7) Family income (8) Family residential area
	Non-marital fertility is affected by family structure	Marital status	Date of change of marital status	Family structure	(1) Dates of births (2) Age of woman (3) Residential census
	Marital status affects coital frequency	Marital status	Date of change of marital status	Coital frequency	(1) Coital frequency for specified period
Marital status affects likelihood of abortion being employed when pregnant	Marital status affects contraceptive use	Marital status	Date of change of marital status	Contraception	(1) Whether history of sexual relations (2) Contraceptive history
	Marital status affects likelihood of abortion being employed when pregnant	Marital status	Date of change of marital status	Use of abortion	(1) Pregnancy history (2) Abortion history

assumed to be complete in that they were not ended because of the death of the child.

8.10 OVERVIEW

The most important point to make is that the constraints on fertility examined here were mankind's original constraints and that we are experiencing the last period in many Third World countries during which they will be of any great importance.

The evidence seems to be that marital fertility in nearly all societies — certainly in the agricultural societies of Asia and Africa — approximated *natural fertility*. Traditional contraception or abortion, and even infanticide, had no great impact on marital fertility, and, in most societies, were probably almost unknown. The evidence is less certain in the case of extra-marital fertility, and less certain for hunting and gathering societies than agricultural societies, but we would hazard a guess that it will eventually be shown that such methods played no great role in determining the general fertility level of most traditional societies.

Fertility, in the absence of sterilizing diseases (and they may have had more impact during the last 100 years than ever before), was determined by nuptiality (including the degree of acceptance of polygyny and widow remarriage), lactation practices, post-natal and terminal sexual abstinence, coital frequencies within marriage, and the extent to which fertility outside marriage was proscribed. An important point is that nuptiality is not of itself a factor determining fertility. It achieves its impact solely from the extent to which marital fertility is more socially acceptable than non-marital fertility and the extent to which society can exercise control. Where age-specific non-marital fertility rates equal marital fertility rates, nuptiality may remain of importance for the organization of at least some households, but it ceases to have any significance in the domain of fertility.

We are witnessing the latter stages of a global transition from a situation where lactation, abstinence and coital frequency almost entirely controlled marital fertility to one where the significant controls will be exerted by contraception, abortion and sterilization. All studies appear to show declines in the duration of lactation and post-natal sexual abstinence to the point where some time in the next century lactation will determine such short periods of amenorrhoea that contraception from shortly after birth will become the general practice and where sexual abstinence after birth will rarely exceed the period of amenorrhoea. Terminal abstinence will probably disappear even more rapidly. In those societies where there are very

low levels of coital frequency in the middle and latter years of marriage this too will probably tend to change. The area where prediction is more difficult is that of non-marital fertility.

Thus, in most of the Third World we are still in a period of transition: in nearly all in terms of lactation, in many with regard to terminal sexual abstinence, in a significant number in the case of post-natal sexual abstinence, and perhaps in a few with regard to increasing coital frequencies. The research task is twofold: to measure the extent to which these behavioural factors still constrain fertility, and to measure the rate of change and likely future change. The latter is the more difficult problem, first because it calls for comparisons with past measures or for the use of retrospective data in areas where measurement has not been good and often has not been attempted, and secondly because it calls for an understanding of religious and moral pressures mediated through communities and families, as well as individual guilts, of a type rarely investigated by the fertility researcher and largely unsuited to study through interviews with single members of households.

Lactation practices, post-natal and terminal female sexual abstinence, coital frequency and non-marital fertility are not such a disparate ragbag of influences on fertility as might at first appear. In traditional societies they were, and to a considerable extent still are, aspects of the same thing: the proper behaviour of females between menarche and menopause with regard to sexual matters and to the relationship between motherhood and sex. In nearly all traditional societies this is the very core of morality: how daughters, wives and mothers behave with regard to the matters that are central to their existence, and the differences from male behaviour explain why there is a female sex. These are not really secular matters, areas of viewpoint and choice. In one way or another, the moral concerns of this area derive from religions and moralities that are more than a matter of capricious choice. It is this religious and moral imperative that has made behaviour in these areas a matter for everyone's concern. This is why the older generation have felt obliged to instruct, guard and discipline the young, and why communities have felt that families could not be allowed to follow their own bents in such areas of behaviour. Thus it is not possible to understand behavioural changes with regard to these practices without investigating changing moralities, the transfer (or partial transfer) of some behavioural areas from the religious to the secular sphere and the related withdrawal of the community or the older generation from dominating decision-making. These changes are embedded in larger social and economic changes.

Everywhere, moral issues have counted for less in the sexual field as contraception has broken the link between sexual relations and reproduction. Pre-marital pregnancies and enforced marriages have meant less as the couple immediately involved were more likely to be able to secure their own economic support rather than being dependent on the patrimony and the family farm. Imported Western social influences have played an important role.

The research on change should be first and foremost an investigation of changing religion and morality. However, it is easier, and involves fewer risks of misinterpretation, if a case study and anthropological approach is taken to the decision-making mechanisms and their mode of operation in each case.

An approach based on researchable propositions is deeply worrying. The propositions usually rest on research in a limited number of societies, but, by their existence in this form, tend to seek universality. They tend to understate the differences between societies and the extent to which the behaviour described by each proposition existed only in the total context of the culture in which it was investigated. The search for social scientific and demographic universals is a far more suspect undertaking than the attempt to understand demographic behaviour in a specific cultural setting.

Some specific examples, already contained in the propositions set out earlier, should help to illustrate this.

Post-natal sexual abstinence has been most extensively described for Africa. It seemed to Saucier (1972) clear that such practices were most likely to be found in societies characterized by patrilocality where women remained strangers, and where they were kept in their place by polygyny, widow remarriage, clitoridectomy and brideprice (and it remains worthwhile to test these hypotheses between different African societies). Yet, subsequent work revealed the institution in Javanese society (Singarimbun and Manning 1976; Hull 1978) where patrilocality is not the rule and clitoridectomy is not practised. More recently there has been evidence that it may have been widespread at least in south India until recent decades (Caldwell *et al* 1982) (evidence on longer durations that was missed when interviewing 15–44 year-old women but was described by all older women), that is, in a society characterized by low levels of both polygyny and remarriage. Similarly, Whiting (1964) argued that the duration of abstinence was explained by the available diet, using as evidence the reports of tropical Africans, who explained the need for child-spacing in terms of child health and the danger of protein malnutrition, and the ecology of West Africa, where abstinence appeared usually to be longer among

the tuber-eating forest peoples than the grain-eaters of the savannah. Carbohydrates meant long abstinence and proteins accounted for short periods. Schoenmaeckers *et al* (1981) argued on the contrary that the West African pattern of post-natal sexual abstinence was evidence of differential cultural erosion and the recent evidence from India seems to bear this out. It is becoming ever more possible that much of the human race once practised post-natal sexual abstinence from one to several years, but that the rise of the major religions largely changed this situation. When the change occurs, the previous behaviour is forgotten within a generation or two even to the oral tradition, as the Indian research indicates.

In Third World countries coital frequency has been little investigated. There is diffuse evidence for Hindu society in India of very low levels of coital frequency in many marriages, especially once the wife is in her mid-thirties (and her husband perhaps 40) and some indirect evidence that levels may be rising (Srinivasan *et al* 1978). It is possible that Hindu society is unique, but this is a matter for research.

Finally, it might be noted that the situations with regard to lactation and its relation to amenorrhoea, and with regard to non-marital fertility, are probably even more culture-specific.

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9 The Interplay of Health and Society: Towards New Surveys of Mortality Determinants

John Hobcraft

9.1 INTRODUCTION

For far too long demographers have been concerned with a very restrictive study of mortality. The tradition of pure measurement of levels and trends, spiced with a few studies of differentials, still pervades most work in the subject. To a great degree this has reflected undue concern with census-type enquiries, which include a very limited range of questions, coupled with vital registration where available. The very desirable shift of emphasis towards micro-level studies is recent and still under way. It has occurred mainly in the study of fertility and a major factor in the spread of micro-level analysis has been the increasing dissemination and availability of results from surveys (including public-use samples from censuses) for secondary analysis. The World Fertility Survey has been a substantial contributor to this movement.

The shift of emphasis towards sample surveys as a major vehicle for demographic research has been occurring at the same time as major moves against quantification in sociology. Thus we have also witnessed a growth in activity in alternative approaches, both quantitative and qualitative. These include village studies and other quasi-anthropological work, use of focus groups and broad interpretative studies of societal, community and institutional aspects of behaviour. It is probably fair to say that these alternative approaches have generated a richer vein of hypotheses and new insights than has most survey research. To some extent, this reflects the greater selection of the few who choose to work outside the mainstream. This paper does not advocate reliance on any one approach. The means of collecting information should be determined by the nature of the questions we are trying to answer. However, it is our strong view that answers to important questions deserve quantification if at all possible.

We need a clear framework for any analysis, be it quantitative or qualitative. The framework need not be society specific. What it can contribute is awareness

of the omission of factors which may be crucial contributors to our understanding of a process. In the health field there is a growing appreciation that programme success depends quite considerably on non-medical factors. Some frameworks have been put forward recently in order to clarify the substantial importance of individual socio-economic attributes as determinants of mortality (Mosley 1983; Chen 1983). Caldwell's (1979) influential paper on the role of maternal education as a determinant of infant and child mortality relies largely on qualitative interpretation. Caldwell's provision of a shopping list for further research is a valuable contribution as many of the possibilities were being overlooked or perhaps too easily dismissed. Yet the implicit framework requires quantification to indicate the relative importance of each of the paths through which maternal education is hypothesized to act: some paths may prove of no consequence.

While frameworks act as shopping lists and alert us to the range of factors which may be relevant, design of any study should be influenced a great deal by what is already known. This includes studies both within and without the society concerned. All too often surveys and anthropological studies fail to capitalize on national or international studies. National survey practitioners often fail to pay due attention to more localized studies and people studying one village often remain blissfully unaware of its atypicality.

It is with this background that we approach the study of mortality and health. We shall place considerable emphasis on the interplay between individual and macro-level determinants of mortality and health. We cannot and shall not ignore medical determinants, but feel a demographer's contribution comes mainly from examining the interplay between individual attributes and the social, economic and political context on the one hand and the medical and public health components on the other. We shall emphasize survey approaches, partly out of the desire for quantification, but also simply because elaboration of several strategies for integrated treatment of mortality and health

is not feasible here. As it is, our lack of experience with surveys of the kind propounded here is sufficient to make the task daunting.

9.2 MEASUREMENT OF MORTALITY, MORBIDITY AND HEALTH

Before moving on to the main focus of our discussion, which relates to the broader determinants of mortality and health, we cannot avoid touching upon the considerable implications of measurement problems. Death is a relatively rare event, especially for adults in the prime ages. This means that the study of mortality often requires quite large samples. Most countries lack vital registration systems which makes recording of deaths problematic. For many crucial questions, a prospective study on a large scale is the most desirable approach. Yet such studies are expensive and often beset by organizational problems and sample attrition. In addition, they can rarely be established so as to be nationally or even regionally representative. But the handful of good prospective studies, even quite small ones, have produced invaluable insights into links between disease and nutrition. (For a large prospective study, see Chen *et al* 1981; for a valuable small study see Mata 1978).

More commonly, available resources permit a retrospective study. In such circumstances, there are very great obstacles to the measurement of adult mortality in a way that permits useful linkage to individual, societal and health provision characteristics at a relevant time. Standard indirect questions about survival status of close relatives provide almost no indication of when the death occurred and rarely are questions asked about attributes of these close relatives. For child mortality the problem is less acute, both because parental characteristics are salient and the range of ages at death is smaller. Moreover, recent experience using complete birth histories suggests that moderately reliable information can be obtained on survival status and ages at death of each child a woman has borne. This permits many additional analyses. When combined with careful retrospective questioning about other relevant factors, there is a possibility of focused analysis. However, there are decided limitations to retrospective questioning. For example it makes little sense to expect reliable responses to questions about medical services or knowledge many years ago.

Causes of death are notoriously difficult to measure. Accurate diagnosis often requires a high level of medi-

cal expertise. Yet a powerful case can be made that even a rough indication of the relative impact of various causes provides a decent basis for health planning (eg Allman *et al* 1983). Recently, WHO has begun to experiment with lay reporting (WHO 1978) and the Centers for Disease Control is experimenting with retrospective questions based on symptoms for a survey in Jordan.

Morbidity is another area of great complexity. In some cultures diarrhoeal diseases are so prevalent that individuals may not reliably report incidence. For retrospective work the current prevalence, as measured by an episode in the past two weeks, may be all that can be usefully obtained. The incidence of measles can probably be adequately determined by retrospective questioning. The impact of poliomyelitis can be gauged from incidence of lameness. A few key morbid states can be monitored, but morbidity elements of any simple study need to concentrate on morbid conditions that are frequent, salient and can be adequately measured.

It is often suggested that more emphasis should be placed upon indicators of positive health, as opposed to concentration on negative outcomes. Examples of such indicators are growth and development. Except in very detailed studies, or where use of growth charts is commonplace, suggested positive health indicators for children usually come down to weight for age measures, which give useful indications of overall nutritional status, but are vulnerable to age misstatement. For adults, height and weight can give indications of the outcome of their past growth, nutrition and health. One problem with these positive health indicators is the difficulty of obtaining such information for the deceased, which inhibits their use in the study of mortality, except in prospective studies.

It is salutary to review these problems in measurement of the dependent variables for which variations have to be explained. There is little point in elaborating theories of the ways in which a host of variables combine to determine the level of a variable we can barely measure. For retrospective studies, this suggests that we should focus on the determinants of infant and child mortality. This is justifiable on substantive grounds as about half of all deaths in many of the poorer countries occur to children under age five. Without new approaches to measurement or large prospective studies it seems that our considerable ignorance of determinants of adult mortality in the developing world will persist. We can study differentials in health practice and take-up of services but will have difficulty relating these to mortality outcome. There are somewhat better prospects for study of

some morbid conditions for adults. For the remainder of this paper we shall thus give far greater attention to infant and child health and mortality, although many of the issues are the same.

9.3 PRECURSORS TO A STUDY

It would be misguided to launch any study of the societal determinants of mortality or health without knowing a great deal about the society in question. An essential starting point is to discover the nature of the health system. How is it currently organized? Is there an emphasis on primary health care and if so is this selective in its orientation? How far is there strong political will for devolution of health services into rural communities? Does the country place great emphasis on achieving equity in service provision (see Roemer, 1983)? What proportion of the health budget goes to large hospitals? (For example one-quarter of the entire health budget for Kenya goes to a single hospital in Nairobi; see Mosley 1983). Are efforts to improve services concentrated on the urban elite or do they try to compensate for deficiencies by focusing on the most deprived areas? Are there attempts to disseminate health information through child-to-child programmes? What specific programmes are under way? Have there been extensive immunization efforts? Where did these take place? What are the major debilitating diseases and causes of death? Do specific programmes focus on these? Are growth charts extensively used and if so where? Is there a strong indigenous medical system and has any attempt been made to integrate this into the broad health structure?

Without a basic understanding of the health background as answered by many questions of this kind any study is doomed to remain unfocused and thus wasteful of resources. Of course, one contribution any survey or other detailed study can make is to assess how far the reality in remote rural areas corresponds with the description obtained from senior medical personnel or politicians in a capital city.

As well as obtaining an understanding of the organization of health services, it is also undoubtedly important to be knowledgeable about the society. For example, is much known about knowledge, attitudes and practice of health care by individuals? How might power structures within the family and community affect decisions about health care? What support systems exist for the elderly? These are more likely to be unknown but may be key variables to study in order to get at the societal underpinnings of health. We return to this topic later.

A further important element of preparation before

embarking on any new study is to make full use of past work. This needs to be quite wide-ranging and it is likely that some re-analysis or new analysis of old materials would be profitable. Perhaps sometimes most can be gained from analysis of secondary sources rather than investing in new elaborate fieldwork. An example where demographers are largely to blame for poor exploitation is use of census-based mortality estimates for small administrative areas (exceptionally see Kibet 1981, and subsequent use by Mosley 1983). These can be especially valuable when keyed to the few socio-economic variables contained in censuses and can then be used in conjunction with a range of other administrative statistics on service provision and other topics to help assess and plan health services. As another example, some surveys remain unanalysed and most are not fully exploited. Often useful questions can be answered in this way and secondary analysis should always be encouraged.

Naturally it is important to be aware of outcomes of earlier studies. The problem is usually to locate the full range of relevant studies. For example, there may have been national surveys, small-scale surveys, programme or intervention monitoring and anthropological studies, all of which may provide useful insights about relevant questions. Often overlooked is the need to discuss the health care system and its societal underpinnings with people who are active in rural areas. Their opinions can provide useful indications of the important social inhibitions to programme success. The line between detached observation and opinion or involvement is often difficult to draw clearly here.

This constitutes a formidable amount of knowledge and information, to which has to be added the need for awareness of relevant research elsewhere. It is perhaps here that a sensitive, well-informed outside advisor with continuing links with the society can be most valuable. All too often outside advisors fly in with a preconceived list of research hypotheses or questions and succeed in using their supposed greater experience to minimize any contribution from investigators in the country. Hard-pressed officials often have little incentive to gain a deep understanding of their own society and may have almost no sympathy with traditional rural life and attitudes, making identification of relevant issues unlikely. However, we believe such a thorough assessment to be a critical element in planning any study.

So far we have said little about what the study being planned consists of. In keeping with the spirit of this Seminar we shall assume that a national or regional sample survey is being designed. We shall also assume that there is a desire to get at the societal aspects of health care. Perhaps the Ministry of Health has been

disappointed at its level of success in achieving health care for all and has begun to be aware of the debate about the key role of factors such as education in the take-up of the services it so diligently sets out to provide. We must stress here that other studies may be more appropriate in many circumstances, especially small-area evaluations of specific interventions and medically oriented prospective studies which attempt to pin down the relative importance of medical and social factors for a specific disease or problem. We shall stress the latter type of study later in this paper.

An alternative possible background is that an international agency has recently become convinced of the importance of a broader social context in determining health care success and is encouraging the government to mount such a study. Or even that a university research institute perceives the interplay between social and medical factors as an important research topic, for which it may raise suitable funds.

Whatever the background there are likely to be many common elements in surveys of this kind. One important topic is bound to be availability and accessibility of services. This is a key area where the interplay in determining mortality between individual attributes, knowledge and attitudes on the one hand and actual availability and accessibility of services on the other hand can contribute a great deal to our understanding. A further important area is more concerned with the individual's health care knowledge and practices. These may be determined by pressures within the family or community which affect freedom of action. In addition, there are other factors, for example sanitation, nutrition, breastfeeding and income, which are relevant to any attempt to assess relative roles of mortality determinants.

9.4 AVAILABILITY AND ACCESSIBILITY OF SERVICES

In this brief section we are concerned with provision of services, which can often be usefully measured at the aggregate or community level. We delay discussion of how this provision is mediated by individual knowledge, awareness and propensity to use and by other constraints such as income, all of which can only be measured for individuals.

The aim here is to find out about both fixed and mobile services. For assessment of service provision, we dislike placing emphasis on the 'community' in all cases, as it is just as important to know about provision in urban segments which may not correspond to the notion of community. Due recognition needs to be taken of consequences of size of any area constituting a cluster for which information on service provision

and accessibility is collected: variations in accessibility may be sufficient to preclude community or cluster-level measurement.

Our interest is wider than seemingly simple questions of the existence of hospitals, clinics or dispensaries. In many countries there are cases of hospitals which cannot function through lack of supplies. Thus the lead of Chayovan and Knodel (chapter 15) should be followed and visits made to identified facilities to check whether services are adequate. For example, it is important to know opening hours or days for dispensaries. If the country has adopted its own list of 20 essential drugs, following WHO recommendations, it is worth checking which of these are available. While travel time is a viable indicator of accessibility, it may make a considerable difference if the facility is in a place to which users would regularly travel for other purposes: perhaps the local market town. In such cases it could prove useful to discover from individuals whether they do visit this place regularly (see Jones 1984). Where relevant, the charges for a few simple but frequently required services should also be ascertained; examples might be delivery costs for a birth, setting a broken limb, and provision of anti-malarials or oral rehydration packs.

Care must be taken to identify mobile services. Again, the design of exact questions requires a knowledge of the range of modes of service in the area or country being studied. What are the differences in cost, if any, between trained midwives and traditional birth attendants? Can key differences in training be identified? Are there regular visits from mobile vaccination teams; with what frequency; what vaccines are available? Do doctors or nurses visit the community or individual households? If so, how often and at what cost? Are there periodic health information dissemination attempts? What is their nature?

It should be clear from the above indications that we feel community interviews should be semi-structured to try to ensure that relevant aspects of service provision and accessibility are not missed. At the pilot stage, we might advocate use of focus groups of 10-12 people discussing health issues more broadly in several differing areas in order to clarify relevant questions and issues. Obtaining useful and quite detailed information probably requires cross-checking through several respondents, perhaps in a joint discussion and it is desirable to check the actual facilities and travel times. Coding of semi-structured interviews should not pose insuperable problems in view of the fairly small number of areas included in most surveys.

One further aspect of availability which rarely receives enough attention is the nature of change over time. It is probably not feasible to enquire in too much detail about the distant past, but it is almost certainly

worth trying to elicit information about whether each service existed, say five years before and any relevant changes in accessibility (eg WFS Nigeria community-level questionnaire and Chayovan and Knodel chapter 15). When a service has only been provided in the last year it is unlikely that it had any noticeable impact upon survival chances over, say, the five years before the survey. Without indications of changes over time we may obtain misleadingly weak relationships with survival chances from retrospective questions (much the same argument applies to individual attributes – see Hobcraft 1984).

The above discussion concentrates on purely medical services, but there are many relevant public services which ought to have an effect on health and survival chances. The 1980s is the decade when WHO is placing great emphasis on provision of a clean water supply. Checking on availability of standpipes is relevant in some countries. On the whole, though, it is probably more relevant to discover the nature of the source of supply for washing, cooking and drinking for each household. Several studies (Hobcraft 1984; Martin *et al* 1983) have failed to find a relationship between current water supply and retrospective infant and child mortality, suggesting either that more precision on timing of provision and utilization is needed or that more needs to be known about intermediate storage and food preparation practices. The medical links between contaminated water supply and diarrhoeal diseases are well established. An interesting study on Malaysia (Butz *et al* 1983) found a clear relationship with water supply but with a strong interaction between this and breastfeeding in determining infant mortality outcome. Availability of sewerage can be the key to provision of flush toilets. The evidence of reduced infant and child mortality for households with a toilet is unequivocal and seems not to be a pure socio-economic status indicator (Hobcraft 1984; Martin *et al* 1983; and Butz *et al* 1983). Provision of adequate refuse disposal is also likely to affect health outcomes. Once again we feel that much useful information here is better obtained about individual households. Perhaps it is better to inquire about food and water storage practice and timing of cooking in relation to eating than to just find out about the source of heat used for cooking. Use of a refrigerator can make good health easier to achieve in the tropics, but will be extremely rare in many societies.

9.5 KNOWLEDGE, ATTITUDES AND PRACTICE

The major lacuna in many epidemiological or medical investigations of the impact of health services is the

failure to take account of many of the barriers between individuals and services. Demographers also largely neglect this important issue by relying to a major extent upon relatively standard socio-economic variables, although a strong case can be argued for the fairly direct relevance of income and education. Income may permit use of expensive (by local standards) services and undoubtedly provides opportunities for better nutrition, housing and sanitation. Yet even here, at least one study on Bangladesh demonstrates that higher family income is associated with better nutritional status only for children of literate mothers (Bairagi 1980). Caldwell (1979) has outlined many paths through which the mother's education probably affects her children's survival chances. As mentioned earlier, these need clarification through more detailed study, if only to indicate whether a few focused and much cheaper interventions might be more cost-effective than full education.

Separation of ministries of health and education often means that very little direct health education gets into school curricula. Yet there are a series of basic personal health and hygiene measures which require little medical intervention. Is soap available in the house and is it used for washing hands before preparation and eating of food? How is water stored? Is food cooked many hours before consumption? How does the mother treat the inevitable diarrhoeal episode: for example, by starvation or through rehydration? (See Mosley 1983 for a fuller discussion of some of the underlying linkages and Centers for Disease Control (CDC) 1983 for an example of questions on diarrhoeal incidence and treatment.)

Moving up the scale towards more formal medicine, we can begin to study the interplay of individuals and medical service provision which determines use of services and may have an ultimate effect on health and mortality. Are mothers aware of existing services? Perhaps we should also try to get at knowledge of the implications of a few common childhood symptoms and, more importantly, discover what the mother would do in response to these symptoms. Who would she consult: husband, parent, friend, traditional healer, doctor, etc? What treatment would she adopt initially? If at least one or two of the common symptoms described are really serious and necessitate medical technology and skills, we can begin to build a picture of whether the woman regards local medical facilities as salient. Some follow-up probes to detect the degree of attachment to family and traditional healers and at what point, if any, modern medicine might come into the picture seem desirable. These are difficult areas to probe adequately with a few simple questions, but useful progress could probably be made. Likely topics may include questions on diarrhoea,

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childbirth, malaria and measles. Perhaps hypothetical questioning can be avoided by asking about recent occurrences and what was actually done.

This brings us to actual practice. A key topic which can be easily addressed is immunization of children against measles, polio and diphtheria, pertussis and tetanus. It is quite common to probe extensively about use of maternal and child health services, including questions on pre-natal examinations, anti-tetanus injections during pregnancy, attendance at and type of delivery and post-natal checks on infants (eg CDC 1983 or Singh 1984). It is also possible to ask individuals about use of particular facilities in some period before a survey (from a week to a year), including reasons for access.

While we have once again only been able to provide examples and indications of the questions we would use, the general thrust of our approach should be clear. We believe use of services is determined both by their availability and accessibility and by the population's awareness, trust and willingness to use such services. Factors such as education and income affect both accessibility and the individual's propensity to use. The joint outcome determines take up. We can then link mortality to such an inherent framework to assess actual impact. This is a complex task and the tentative nature of our proposals reflects lack of experience in collection and analysis of material of this kind. Development of this important area in monitoring health requires a concerted effort involving social scientists, epidemiologists and survey statisticians.

9.6 NUTRITION AND DEVELOPMENT

We have sketched some of the important aspects of community and individual health care and outlined issues in measuring mortality. When studying child mortality it is essential to include some assessment of nutrition and development. Wherever it is possible to obtain birthweights for each child or recent births, this must be done. The Rand survey in Malaysia seems to have usefully collected this item for all births in a retrospective birth history (DaVanzo *et al* 1981). Birthweight is fairly generally regarded as a key factor in early survival and undoubtedly serves to capture many of the important determinants of pregnancy outcome. Ideally we would wish to know gestational age as well, in order to distinguish premature births from those which are small for gestational age. It is likely that a high proportion of all effects of maternal nutrition and weight gain during pregnancy, age and parity of the mother, and her rapidity of recent childbearing are

reflected in this key outcome variable. Some remarkable findings from a longitudinal study in Santa Maria Cauqué, Guatemala suggest that neo-natal death rates within birthweight categories were no different from those in Baltimore, USA, although there was a marked divergence in the post-neonatal period (Mata 1983).

Wherever growth charts are routinely used, especially if left at the house, access to these is highly desirable. If we are able to assess weight for age and, perhaps, growth velocity for deceased as well as surviving children, this permits a whole range of new analyses.

In many societies, we have to be content with indirect indicators of these aspects of nutrition, by collecting information on early infant feeding practices. There is a growing volume of evidence concerning the considerable nutritional and immunological advantages of human breast-milk as the main or exclusive food for about the first six months of life and its great value as a component of diet right through the first two years of life (Ebrahim 1982; Population Information Program 1981). Information for recent births on duration of full and partial breastfeeding is always useful. Some indication of the age at and type of first supplementation and whether always boiled or cooked should also be helpful.

9.7 CONCLUSION

The interplay of service provision and accessibility with a fairly wide range of individual and household health determinants seems a high priority for careful investigation. It is clear that such research could easily lead down paths which require subsequent focus on different aspects of the community and its institutions. We have touched on but not elaborated at least one of these areas, namely the role of various family and community members in limiting or guiding action on health care. We suggest beginning to collect relevant information here but would not advocate much concentration on this area unless or until the importance of the pathway is established.

Our preference for quantification where possible has led to a focus on an outline for a survey of societal and individual determinants of health and mortality. This still means that any analyses need to be placed in a qualitative context, including the nature of political organization of health provision. It is clear to many observers that conventional, westernized, hospital-based medicine has failed to achieve major health gains (Morley 1973 is an example). Hence the recent emphasis on primary health care, whether selective or not (Walsh and Warren 1979). As medicine or health

care moves more into the community, so evaluation of programme success or of mortality determinants has to take greater account of the community and its composition.

We have not paid sufficient attention here to the underlying framework for the analyses we would undertake. A great deal is however implicit. We regard this as a major omission and would guide the reader to recent statements by Ruzicka (1983), Chen (1983) and, especially, the important paper by Mosley (1983). Chen produced a diagrammatic representation for child mortality, which is linked to an earlier version of Mosley's work but has the advantage of taking a sequential or life-course perspective. We agree with this view and think it would be very useful, for example, to have a series of careful studies which monitored pregnancy and subsequent survival on a prospective basis in order to elucidate many of the poorly understood mechanisms.

To take but one example, there has been a recent flurry of work originating from WFS on child-spacing effects on infant and child mortality (Alam and Cleland 1984; Cleland and Sathar 1984; and Hobcraft *et al* 1983). Fairly extensive reviews of the literature in this area reveal major omissions in knowledge. That there is a clear association is not in doubt. There is still debate about whether there is a causal link or not; and there is unresolved debate about the relative role of maternal depletion caused by rapid, repeated child-bearing, which should result in low birthweight (among other things?), and of competition between surviving siblings. There are many subtle issues, including, for example, differences between mothers in their propensity to breastfeed and the duration thereof; sharing of food resources within the family; the role of other determinants; and links to maternal age and parity. Yet no satisfactory study exists.

The above example raises one key issue: the role of other determinants. A need for clear and all-encompassing frameworks is recognized to alert us to those (possibly) key factors on which we have no information. All of us are aware of the problem of important omitted variables or specification errors in models. This is not a problem that will ever go away. But we do need, at the very least, to be sensitive to important determinants other than those included in our analysis. This is one reason why emphasis has been given here to the need for information which does not relate to community or institutional determinants as such. All of the issues and topics covered have either been demonstrated to bear strong links with mortality or are attempting to reach other important dimensions of the determinants. We may still have some key omissions. However, it is not very useful to examine linkages of

mortality to hospital provision alone. Many other factors conducive to improved survival chances can be clustered among individuals who happen to live near to a hospital.

It may be helpful to consider a few examples of the kinds of findings or analyses that are appropriate, although thorough analysis of a large local, regional or national survey of the type outlined here would be a major undertaking. Initially one can glean a great deal from fairly simple tabulations, although any firm analytic conclusions would inevitably require simultaneous treatment of several items of information. For example, is there a threshold in travel time to various facilities in terms of mortality outcome? Does this threshold travel time become shorter for neo-natal mortality? How do socio-economic variables interact with travel time in terms of associations with mortality? Is it only the educated or rich that seem to benefit from services or access to services? Is there an association of infant and child mortality with clean water supply? Is it mediated by breastfeeding? How do these relationships change with age of child, at least as far as the second birthday? What proportion have been immunized? Does immunization have the expected mortality-reducing effects? Is availability of trained midwives linked to variations in neo-natal mortality? How are these links related to socio-economic characteristics? Are women who had ante-natal care more likely to breastfeed, cook food, boil water or milk and wash with soap? Does this relationship, if any, survive a control for education?

The list of quite simple questions which would throw some light upon the interplay of service provision and social characteristics is enormous. Most of the questions listed above have already been addressed for a few countries (eg Casterline and Engracia 1984 on the Philippines; Butz *et al* 1983 on Malaysia; WFS Community Workshop).

It is also essential to address some more complex issues. How is birthweight and outcome linked to income, mother's education, stature and weight (ideally including weight gain during pregnancy), mother's age, parity and previous birth-spacing and level of ante-natal care? Are linkages of these variables to neo-natal mortality entirely captured by the birthweight? Moreover, how do other factors affect neo-natal mortality? Examples are type of attendance at and place of delivery, perhaps breastfeeding, type of housing (eg built of dung?), water supply and tetanus immunization. As we move into the post-neonatal period and beyond, we expect linkages of mortality and morbidity to socio-economic characteristics, basic health knowledge, willingness to use and accessibility of health services, length of breastfeeding, weight for

age, cleanliness, sanitation and food preparation. After control for such variables (except perhaps weight for age) does birthweight still account for any of the variation? Do any of the maternal characteristics considered for birthweight contribute? What about the impact of subsequent closely spaced births?

Elaborate analyses are essential if we are to move towards a firmer understanding of which aspects of the whole picture are important and the nature of barriers to obtaining benefits from available services. The analyses are bound to be complex and especially concerned to look for interactions. A great deal of care is required in specifying the ways in which effects are most likely to operate and due consideration is needed of any causal ordering. Nevertheless such challenging analysis, if well done, should both considerably enhance our understanding of mortality and morbidity determinants in the developing world and provide a series of useful guidelines for health administrators.

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10 Investigating Community-Level Effects on Population Movement

Graeme Hugo

10.1 INTRODUCTION

The fundamental concern of demographers must be the explanation of demographic change. In population mobility research, however, we have too often been satisfied with the mere description of spatial patterns of various types of movement, the demographic, social and economic characteristics of movers and the estimation of their numerical impact upon population growth or decline. We have failed to carry our analyses further by considering movement as a dependent or an independent variable. Where explanatory analysis has been attempted it has usually involved seeking an understanding of the underlying forces shaping particular patterns, levels and types of movement and changes in those patterns over time and in fact there is a substantial body of research focusing upon causes of migration. On the other hand, population mobility also is frequently part of, or a symptom of, processes producing changes in other social, economic and demographic phenomena, although this has been almost totally neglected in the demographic literature. There is now an extensive case study literature relating to the cause of population movement but our knowledge of changes in mobility patterns remains limited and we still lack a satisfactory and coherent theoretical framework for the understanding of the causes of population movement. There are several reasons for this but one relates to the levels at which studies have been carried out and the basic units of investigation and analysis which they have employed. Population movement research (like fertility research) has tended to focus almost exclusively either upon the individual migrant or large aggregates of population living in a major city or region. There are two sets of problems which this creates. First, by adopting a micro *or* a macro perspective the considerations associated with the alternative approach have tended to be ignored so that only a partial explanation is achieved. Moreover, as Bilsborrow (1981: 2) points out, while the use of purely aggregate data to examine individual behav-

iour is fraught with 'ecological (group) fallacy' problems the inference of conditions or behaviour from individuals to higher level units is subject to 'individualistic fallacy' difficulties. Secondly, it is apparent that there are social units other than the individual and the large population aggregates which have a significant influence in shaping patterns of population movement and which experience the impact of, and are themselves in turn changed by, migration. In the Third World other such social units which are of particular significance in the organization of the daily lives of people are the family and the community. In such contexts individuals frequently feel commitment and loyalty to family and community and they constitute particularly meaningful units of study when investigating and analysing the causes and impact of migration. It has thus been suggested that analysis at the level of community (Bilsborrow 1981; Findley 1982) and family (Wood 1982) may not only be a means to allow key explanatory elements of both micro individual and macro aggregate approaches to be encompassed in a single study but also make a separate and additional independent contribution to explanation.

In this paper the focus is upon the use of the *community* as a unit of analysis in seeking an understanding of the causes and impact of population mobility in Third World situations.¹ It draws particularly upon the writer's field experience in the investigation of population mobility at the community level in Indonesia (eg see Hugo 1975, 1978, 1982a). This paper begins with a brief consideration of the problems involved in

¹The emphasis on the Third World is deliberate. It reflects partly the fact that the bulk of the literature relates to lower income countries and also the writer's own field experience is in such contexts. Lipton and Moore (1972: 10) argue that in less developed countries the village is a relevant and important behavioural unit 'because villagers' decisions are very much influenced by the system in which they live; the system is to a large extent bounded by the village, and at the same time, village wide'.

defining what in fact a community-level approach is and then proceeds to address the question of why community-level studies of migration should be undertaken. It then summarizes how community-level analyses have contributed to an understanding of population mobility. It focuses particularly upon explaining the occurrence of population movements of varying levels and types, understanding the impact and consequences of these movements and in identifying and specifying the inter-relationships between population movement and changing patterns of other demographic phenomena, especially fertility. It should be stressed, however, that community-level approaches to migration research are in their infancy and much of the discussion in this section will relate more to the apparent potential of the approach than its definitive achievements. The next section of the paper is concerned with more pragmatic data collection issues associated with a community-level approach and critically considers some of the types of community-level studies of population mobility that have been undertaken. A final section of the paper comprises a discussion of the strengths and limitations of existing community-level research on population mobility as a basis for making some suggestions for the design of future data collection and analysis strategies of this type.

At the outset some justification should perhaps also be given for including a consideration of migration in a seminar which deals specifically with reproductive behaviour. At a practical level one can argue that some of the experience in employing a community-level approach in population mobility research is likely to be transferable either directly or with some modification to studies of fertility change. Even more pragmatically, contracting resources for demographic field surveys make it imperative that such surveys gather data of value to research in more than one subfield of the discipline. However, by far the most compelling justification relates to the important, but frequently overlooked inter-relationships which exist between demographic phenomena. Probably the major single focus of demographic research efforts and resources in recent years has been in the search for a satisfactory explanation of fertility decline. These efforts have seen the formulation of a wide range of hypotheses linking fertility trends to particular social and economic changes and the development of a huge number and range of data collection initiatives, among which the KAP surveys of the 1960s and the World Fertility Survey (WFS) of the 1970s loom very large, to test those hypotheses. It is, perhaps, paradoxical that in all this activity major efforts have been made to examine

fertility change and its relationship to a wide range of social, economic, physiological and cultural variables, while little, if any, attention has been paid to its complex interactive inter-relationships with other demographic processes. Linkages between changes in fertility, mortality and migration are frequently overlooked because demographers tend to focus their investigations narrowly on single demographic processes like fertility or migration and ignore the often important inter-relationships between them. In studying demographic change it is somewhat artificial and even misleading to study a single demographic process in complete isolation from other processes shaping changes in the size, growth, structure and distribution of populations, since these processes are frequently tightly and inextricably inter-related (Davis 1963; Friedlander 1969). This is especially true of demographic research into fertility and population movement,² and to illustrate this one need only point to the absence of a single migration question in the WFS questionnaires in the vast majority of countries in which they were applied. The opposite applies in many major migration studies which only rarely include usable fertility questions (Zarate and Zarate 1975). Yet the limited glimpses which we have of inter-relationships between fertility and population movement indicate that close study³ could produce a significant potential contribution to our understanding of both phenomena. To what extent, for example, are fertility and population mobility employed as alternative survival strategies among the rural poor in some Third World contexts. It has been suggested that population mobility, through its impact upon the strength and direction of net inter-generational wealth flows, may have a partial role in explaining the fertility transition (Hugo 1983a). The need for inclusion of a consideration of population mobility in fertility studies and vice versa is therefore a pressing one.

10.2 DEFINING AND DELIMITING THE COMMUNITY IN MIGRATION STUDIES

The 'community' constitutes, with the family (nuclear and wider), the clan, the kin group, ethnolinguistic

²The linkages between fertility and mortality (especially child and infant mortality) have been much more fully investigated (see eg Preston 1978).

³Goldstein and Goldstein (1982) have provided a thorough outline of how large-scale surveys can be analysed to examine the inter-relationships between migration and fertility.

groups, regional groups, national groups etc, one of the aggregates of population with which individuals identify and which influences their behaviour. Such aggregates can be influential upon the demographic behaviour of individuals in a number of ways.

- 1 They can directly shape that behaviour by giving explicit directions. In such cases the family or the community etc becomes the decision-making unit (eg when a village community allocates particular villagers to work at particular tasks associated with irrigating their rice fields). Sanctions may be imposed if such directions are not complied with.
- 2 They can have a less direct influence by establishing the structure of constraints within which individuals or small groups make decisions. For example, changes in the patterns of local land tenure and distribution, agricultural practices, availability of non-agricultural work, existing services like schools, transportation and accessibility to the outside world within particular villages in West Java have had a significant impact upon population movement out of those villages (Hugo 1983b). These structural changes, while not directly determining whether movement occurs or not, restrict greatly the choices available to potential movers.
- 3 Another way in which migration behaviour can be indirectly shaped by larger aggregates with which individuals identify relates to the concept of 'reference groups'. As Freedman (1974a) explains 'the individual's self perception and behaviour depends partly on how he compares his own status and behaviour to standards he observes in groups or strata of people with which he identifies himself'. Thus in West Java it was found that in some survey villages movement to the city had become a recognized and accepted part of village life for men. 'It becomes as natural for a man in a particular village to become a bread hawker more than 100 km away in Jakarta as it is for men in other villages to become peasants or agricultural labourers' (Hugo 1981a: 207).

A critical initial question relates to defining the concept of 'community'. This is a complex and difficult task but McNicoll (1975: 8) argues that a community has two essential characteristics — it must possess a legitimate internal administrative structure or an informal means of social control over its members, and its members must at least partially identify their own interests with those of other members. Bilsborrow (1981: 13–16) has considered in some detail the problems of defining and delimiting communities in

migration surveys and concludes that usually logistic considerations dictate that the basis for defining a community will be existing political-administrative boundaries. However, the use of administrative units does not necessarily mean abandoning McNicoll's criteria. In West Java, for example, the *desa* (village)⁴ is a territorial community (Hofstede 1971: 42) but it does have the authority to exercise both legislative and executive power in internal affairs (Hofstede 1971: 51) and a village administration to carry this out. Moreover, although West Javans' primary loyalties are to family, it is difficult to unravel village, community and family loyalties and it is clear that most village inhabitants do identify with their *desa* of origin (Hugo 1981a: 195).

A major advantage of adoption of administrative units to delimit communities, especially in representative large-scale national or major regional migration studies, is the secondary data relating to population movement that can be obtained for those units without engaging in detailed expensive primary collection of data. In West Java, for example, *desa* officials are requested to maintain 61 separate, specially designed registers of various demographic, economic and social phenomena, including details of a range of permanent and temporary population movements (Hugo 1982b). In the course of fieldwork in West Java, population registers in more than 200 *desa* and *lingkungan* were examined, and it was apparent that the extent to which registration data reflect real situations varies greatly with customary local practice and the diligence of village officials, especially the *juru tulis* (village secretary). In some villages with traditions of efficient local administration, officials have stressed the importance of registering events to such an extent that it has become almost automatic among village inhabitants. However, village secretaries (there are often more than one in a village) are often overworked and may not be able to devote sufficient time to keeping registers. Nevertheless most villages have population data which will be stored in a form which will allow regular updating.

⁴The mean population of *desa* in Java in 1981 was 5640. The 14 villages studied by the present author (Hugo 1975, 1978) varied in size from 2219 up to 11 576. The *desa* 'generally consists of a number of wards, called *kampung*, that are widely scattered. Besides there are also villages that chiefly consist of one central settlement ...' (Hofstede 1971: 42–3).

10.3 WHY SHOULD COMMUNITY-LEVEL MIGRATION STUDIES BE UNDERTAKEN?

The case for the special need for community-level approaches and the inclusion of community variables in the study of migration has been made in some detail by Bilsborrow (1981: 1–10) and Findley (1982: 276–82) and only a few issues of basic importance will be raised here. The first relates to the suggestion that there are community variables which have separate and independent effects on population movement to individual variables. Obviously there are significant differences between villages in their changing patterns of mobility, but it is not so obvious as to how far these observed differences can be attributed to differences in global community variables and how far to individual variables. With respect to fertility studies, Freedman (1974a: 6) points out that there 'are relatively few instances in which measures of some aspect of the community or social milieu as ecological or collective properties have been related to measures of fertility or family planning for individuals'. More recently several studies have documented the independent effect of community-level variables. Anker (1977) discovered in his Indian study that group-level variables of caste and village had a statistically significant independent effect on an ideal family size, family planning acceptance and completed family size. Rosenzweig and Schultz (1982) show using data from the 1973 census of Columbia that the availability of medical services, family planning activities, transportational infrastructure and climate in addition to mother's education are associated with child mortality and fertility. As will be shown later, there is ample evidence of independent effects of the village community as the context of migration decision-making and impact. Lipton and Moore (1972: 12–13) point out 'villagers are often engaged in a village-wide system, in the sense that the bulk of their relationships with other people are structured and limited by the village in which they live and work; to understand their behaviour one must understand the context within which their decisions are made'.

Przeworski and Teune (1970: 49–57) have suggested that 'global' or 'setting' variables are of five different types. These types, together with some examples which the author has found to be of significance in examining community-level effects on migration in Indonesia are listed below.

1 Historical — eg whether or not the community was

at some stage visited by labour recruiters (*mandor*) perhaps even as far back as the Dutch or Japanese occupation eras.

- 2 Institutional — eg whether or not the village has particular facilities such as schools, hospitals etc.
- 3 External — eg whether or not there is a sub-community of ex-villagers established in a city (where perhaps they have formed a formal urban association) who maintain links with the village.
- 4 Behavioural — eg the extent to which local village leaders are entrepreneurially oriented and are willing and able to develop local employment generating activities.
- 5 Physical — eg the extent to which local terrain makes communication with the outside world difficult.

There is, however, a further justification for undertaking village studies and this relates to the fundamental distinction which Mitchell (1978: 13) makes between two, related but analytically different, perspectives in examining human behaviour like migration. He says that consideration must be given to both the *setting* and the *situation* of that behaviour. 'The setting is provided by the macroscopic, economic, political and administrative structures of the regions in which the migrant is involved, while the social situation is represented by the particular sets of circumstances in which migrants, actual or potential, of a particular category find themselves'. What has happened in the examination of causes of migration is that a polarization has developed between two analytical frameworks which increasingly have been seen as competitive. One places emphasis on the situation of migration while the other is concerned predominantly with the setting of that behaviour. On the one hand is the 'neo-classical, human capital-maximising approach which regards the migration decision as a purely individual and economic decision, with the goal of maximising the expected future income stream over space' (Bilsborrow 1981: 4). On the other hand is the historical structural perspective which sees population mobility as 'a response to broader socio-structural changes associated with the uneven penetration of capitalism which has created substantial sectoral, class and spatial inequalities' (Hugo 1982d: 71). Much of the difference between the two approaches is in the level of investigation adopted. The former are based on studies of individuals, whereas the latter arise out of consideration of macro-structural societal forces. Moreover, as Wood (1982: 312) has pointed out 'The former refers primarily to individual choices, while the latter refers to the structural conditions to make certain

choices possible. In principle it is clear that an understanding of population movement must encompass both the determinants of the parameters of behaviour and the factors that motivate individual actors'.

It is suggested here that the adoption of intermediate levels of investigation and analysis such as the household and, especially, the community, facilitate the making of a more balanced consideration of both individual, situation elements and macro setting factors in searching for explanations of migration. By adopting the community as a unit of investigation and analysis it is possible to bridge to some extent the polarization between the macro and micro approaches. As Findley (1982: 276) states, the macro and micro approaches are seldom merged in a single study. It has been the present writer's experience in Indonesia that whereas it is difficult to home in on the mobility effects of some of the major structural changes that are currently occurring in rural areas in individual or household questionnaires, it is sometimes easier to make an assessment of their impacts through a community-level approach.

Hence it is argued here that there should be a consideration of the community in migration surveys for three basic reasons. First, by aggregating individual and household-level data into contextual variables for socially meaningful larger units, our understanding of the significance of those explanatory variables may be enhanced. Secondly, there are community effects which have an independent contribution to make to the explanation of population movement and its effects. Thirdly, the community-level perspective facilitates the incorporation of both macro structural and micro individual considerations into explanation in a way not possible if the focus is upon either individuals or large population aggregates. In the next sections we will outline how some community-level variables have been shown (or appear to be) related to the occurrence of particular patterns of population mobility and particular effects of mobility.

10.4 COMMUNITY EFFECTS AND EXPLAINING THE CAUSES OF MIGRATION

Connell *et al* (1976: 4) in their review of the literature relating to migration from rural areas in Third World contexts maintain that community factors have greater explanatory power than individual ones in determining patterns of migration. In this section we will advance a series of propositions relating community-level effects to the occurrence of migration: these will

be brief because of limitations of space. Moreover, as Abad and De Jong (1981: 17) point out, the literature 'on aggregate characteristics which impel people from the Third World to move out of their places of origin' is very scant so that in some cases here we are advancing hypotheses rather than definitive and fully tested and established findings, but they are nevertheless hypotheses which do have some basis in field experience.

The community can be usefully viewed as the context within which macro-structural forces operate so as to constrain or facilitate movement of individuals or households living within that community. Gardner (1981: 63-4) and Findley (1982: 277) have identified five basic points in individual and family migration decision-making processes where such macro-structural forces impinge:

- 1 Providing norms and values regarding migration.
- 2 Providing real opportunities or constraints relevant to moving or staying, especially economic opportunities.
- 3 Influencing perception of the migration-related opportunities.
- 4 Establishing conditions facilitating or constraining migration, eg accessibility and means of transportation.
- 5 Influencing perception of the actual migration constraints and facilitators.

Most important among the structural factors which influence the level of migration out of a community are those relating to economic opportunities. Moreover the 1970s has seen unprecedented levels of structural and institutional change in the economies of village societies in many Third World countries. In rural communities in Java, for example, this decade saw the rapid spread of the green revolution technology in rice agriculture, increased mechanization of much farm-related activity, increased commercialization of agriculture, changing of traditional land tenure and agriculture labour arrangements, increased penetration of manufactured consumer goods and mass media, a virtual revolution in availability of transportation and changing local power relationships; all of which had major implications for population mobility out of villages (Hugo 1983b). Many of these structural and institutional changes are difficult to investigate at the individual or household levels and their influence can often be more clearly analysed from a community-level perspective, even though they ultimately affect the migration behaviour of individuals and households. Given the importance of economic

factors and structural change within village economies in shaping migration, much of the emphasis here will be upon propositions relating population mobility to changing patterns of availability of economic opportunities in communities. However, despite the overall importance of such economic considerations, it would be unwise to ignore other variables, as has been indicated elsewhere (Hugo 1981a: 187):

'Migration research workers . . . working at the community and/or individual levels as distinct from those dealing with aggregate (usually secondary) data are acutely aware of how poor a predictor of population mobility economic variables are when considered in isolation from social and cultural influences . . . In my own study of migration in West Java, Indonesia . . . it was repeatedly found that villages located in ecologically similar situations with almost identical economies as well as approximately the same level of pressure on agriculture resources differed widely with respect to the level and/or type of population mobility that was dominant. As the study progressed, attempts to predict mobility (or the lack of it) of households within villages on the basis of only their economic characteristics proved virtually impossible.'

Hence we will also consider some propositions relating to other non-economic community-level variables and migration.

The following propositions relate predominantly to the relationship between structural economic conditions and changes in village communities and their relationship to population movement.

1 Migration is more likely to occur from communities with low sustenance opportunities relative to pressure of population (Findley 1982: 280). In agricultural communities inadequacies in the availability of, and access to, productive land tends to encourage out-migration of various kinds (Connell *et al* 1976: 9). In the context of the fertility orientation of this Seminar it should be mentioned that, in such population pressure situations, population mobility may be an alternative or complementary strategy to fertility reduction or vice versa. Smith's (1981) study of the densely populated Ilocos area of the Philippines, for example, links growing regional population densities causally to rates of out-migration and the composition of out-migration streams, to marriage patterns and to the volume of childbearing. However, the nature of the causal inter-relationships is not clear and Smith (1981: 29) concludes that to achieve this 'Survey analysis will be useful, though I think that ultimately field studies of communities may offer the most telling information.

Such studies could yield a combination of information on individual level behaviour as well as ecological and institutional features of communities'.

It is of fundamental importance to appreciate that communities impose a structure on the economic opportunities available to residents and through this structuring exert a strong influence on population movement. There is a wide range of community variables reflecting 'sustenance opportunities' which have been found to be causally related to population movement. Availability of agricultural land has been mentioned but this community effect has been found to be more than a function of man/land ratios. It is access to the means of production that is crucial and this is influenced not only by population pressure but also land tenure systems, arrangements for access to irrigation water, seeds, fertilizer, credit and other complementary inputs. In Java a critical factor in non-migration of the rural poor was the traditional practice (*ba'won*) whereby landless and near landless people had unlimited access to participate in the harvest for a traditionally fixed share of all they harvested. These were part of the strong *bapak/anak buah* (patron/client) relationships which welded bonds of mutual responsibility between rich and poor in villages. In West Java these traditional authority relationships have been explored in detail at the village level by Jackson (1971) and include such elements as 'access to land and employment of the client as either a sharecropper or wage labourer, insurance against unpredictable calamities such as drought and loans to pay off money-lenders' (Jackson 1971: 57). In return the client owes a debt of moral obligation (*hutang budi*) to the patron. In many rural communities an increased commercial orientation has grown up among large landholders, associated partly with the introduction of the new high yielding varieties of rice.

With increased commercialization in many rural communities large landowners are now restricting access to labour on their land and this has been a factor in increasing out-migration (Hugo 1983b). Such changes, while they are made by and impinge upon individuals and households, are difficult to detect in household or individual surveys without a whole battery of very explicit questions. My experience in Java has been that the community-level approaches outlined earlier are more effective in 'flushing out' (to use Findley's (1982: 277) terminology) such changes. In Java other changes in agricultural practices have had major displacing and population movement inducing effects during the 1970s. These include changeovers to more cost efficient and less labour absorptive methods of ploughing land, weeding, harvesting and milling of rice. The high costs of inputs

for the new agriculture and the structure of the credit system is forcing small landholders to sell out to larger landholders. Community-level questionnaires, village records of land ownership and ownership of agricultural equipment and interviews with key informants can be used not only to establish current patterns of distribution of the control of and access to the means of production but also changes in these patterns over recent years.

There is a considerable variation from community to community in the extent to which these changes in access to agricultural land and work are occurring, just as there was in traditional patterns of land tenure and distribution and in other factors influencing agricultural land such as inheritance laws and practice. With respect to the latter Kasden (1965) notes that in communities where the primogeniture⁵ inheritance system is dominant out-migration tends to be greater than in communities where land is divided equally among all male heirs.

Any discussion of access to sustenance in rural communities should include consideration of off-farm employment. In Java, for example, the rural non-farm sector has traditionally had an important (but often overlooked) role in the employment of rural labour. These activities usually involve the provision of goods and services to other villages. These include village administration workers and small-scale traders operating out of a small stall or on an itinerant hawking basis. Many of the stalls and shops are operated as subsidiary activities by villagers engaged in farming. In addition, most villages have some form of small-scale industry usually practised by farmers seeking extra income and whose 'chief investments are labour skill inventiveness, zeal and so on — but no capital' (Aten 1952-3: 331). However, it is clear that the penetration of rural areas by consumer goods manufactured in large cities or overseas has sounded the death knell to many such locally based activities which cannot compete on scale, quality or cost terms. In 1948 Aten (1952-3: 330-45) made an inventory of rural industries in *Kabupaten* Sumedang, West Java, in which he identified 74 separate types of enterprise and 3778 enterprises employing 5395 people. Field checking in the *Kabupaten* in the 1970s indicated that there had been a massive substitution of locally manufactured goods (usually produced by one-person operations using traditional methods) by cheaper, mass-produced goods manufactured in the Jakarta urban region, other major city or overseas. The local employment displacement effects are all too obvious.

⁵ie where the oldest son inherits all the family land upon the death of his father.

The labour displacements within Javan rural communities referred to above are the result of the penetration of village communities by a number of macro-structural forces which are difficult to identify and study in household questionnaire surveys. These include increased speed and intensity of the penetration of the capitalist mode of production in villages, the spread of commercialization and consumerism and the greater integration of the village economy into the national market economy. The effects of such changes upon population movement out of communities are considerable but we know little of their effects on fertility. However, since these forces have labour displacing effects and impinge upon the allocation of labour of many households it would seem to be important to investigate their implications for fertility change.

The above discussion illustrates another important issue in the investigation of community effects on population movement. This is that the approach can be used not only to collect and analyse cross-sectional information to allow the relevant variable and population movement to be considered between communities at one point in time, but also to collect time series information in single communities. Since our main interest is in a dynamic process, namely demographic change, it is imperative that a historical perspective be adopted in examining community effects on population mobility and that information is sought regarding changes with respect to important structural variables.

2 There is 'a direct relationship between out-migration and development programmes or innovation diffusion in the rural sector' (Brown and Sanders 1981: 170). This obviously relates to the discussion of the first proposition. A number of community-based studies have produced similar findings to the Java study reported above. For example, Abad and De Jong (1981: 17) in their study of community effects on out-migration from villages in northern Luzon (Philippines) found that higher levels of development increased the probability of out-migration. Rhoda (1979) in his review of studies of the effects of various types of rural development upon rural to urban migration shows that the following tend to stimulate out-migration in the long term, although in some cases they may in the short run have weak slowing impacts on migration:

The Green Revolution.

Tractorization and other forms of agricultural mechanization.

Increased credit and extension services.

Development of rural enterprises.

Development of rural education.
 Rural public works programmes.
 Rural roads projects.
 International development agency projects.

On the other hand, initiation of the following in rural communities tends to discourage migration to a greater or lesser degree:

Land reform.
 Land rent ceilings and tenancy controls.
 Land colonization and rural resettlement.
 Irrigation projects.
 Rural electrification.
 Family planning programmes.
 Potable water supply programmes.
 Improved rural health services.

However, on balance he concludes that development projects in rural communities have stimulated rural-urban migration and that in 'almost all cases, development activities in rural areas cannot be justified on the grounds that they slow rural urban migration' (Rhoda 1979: 65).

Brown and Sanders (1981: 171) warn against acceptance of a deterministic relationship between innovation diffusion of development programmes leading to out-migration because of the intervening effects of the structure of the local community. In this context they quote the work of Gotsch (1972) who found that 'outmigration was likely to result from the diffusion of technological innovation to a community, but that its magnitude or intensity was dependent upon the material or labour bias of the innovation, social customs and traditions and the distribution within the community of productive assets, political power and institutional services'. However, they conclude that in general 'the development process usually leads to increased social and economic disparities among the population and that the trickle of cityward migration then snowballs into a massive redistribution of people'. The community level is clearly the appropriate level to examine the effects of such rural development programmes. Many of the types of development projects briefly referred to above are likely to have implications for fertility change within communities, especially insofar as they impinge upon the family's allocation of labour and result in an inflow of new and different ideas.

3 Migration is more likely from communities that are accessible or linked to other communities by communication, trade or other linkages (Findley 1982: 280). There can be no doubt that the level of physical accessibility to the outside world of a community has

a facilitating or constraining impact on population movements out of the community. For example, the 1970s has seen a virtual transport revolution in Java which has linked many hitherto isolated communities into the national system. It has been shown (Hugo 1981b) that the proliferation of public road transport and road upgrading in Java has greatly facilitated an increase in the magnitude, distance and periodicity of population movement out of rural communities.⁶ It is shown that this has particularly encouraged an unprecedented increase in the incidence of commuting and circular migration in Java. Transportation linkages also tend to improve the general level of information in the community about alternative destinations and provide contacts at those destinations which 'reduces risk and cost and in general increases the *disposition* to migrate' (Connell *et al* 1976: 15). The full implications of improved accessibility of communities have been little studied. Leinbach (1983: 30-3) found in a 2500 interview survey in communities influenced by construction of feeder roads that they generally experienced improvements in income because of new accessibility to markets, increased spatial mobility, increased penetration of the village by traders of all kinds and government officers, increased availability and acquisition of information such as that regarding off-season employment, credit and crop prices and increased employment from road construction and maintenance. Bilsborrow (1981: 7) has indicated, however, that the effects of provision of roads may be somewhat complex:

'It may help attract migrants from less fortunate areas and help retain people who would otherwise have left in search of those facilities; or it may increase awareness of and interest in other lifestyles or employment possibilities in other areas, and gradually lead to greater out-migration.'

The influence of mass media, especially transistor radios and battery or generator-operated television sets, in influencing social and economic change in contemporary rural communities in the Third World is frequently overlooked. For example in Java it has been shown (Hugo 1983b) that the exponential increase in media penetration has greatly expanded awareness of opportunities outside the village and has been an element in an increased pace of commercialization, social change and challenge to traditional institutions and customary ways of doing things. It should also be mentioned that one of the major achievements of the

⁶In West Java during the 1970s the number of motorized vehicles increased at 10 times the rate of population growth and there was a reduction in the number of persons per vehicle from more than 200 to less than 50.

Independence period in Indonesia has been in the spread of education to rural areas. While illiteracy levels remain high, the massive effort to spread education into villages has undoubtedly been a major force for social change among the young in rural communities during the 1970s, as well as increasing knowledge of the opportunities outside the village.

4 Areas which have major ecological disasters from floods, droughts, earthquakes, volcanic eruptions etc experience significant out-migration (Bilsborrow 1981: 7).

The four propositions above regarding variables influencing migration relate to structural imbalances which create economic pressures within communities and encourage or facilitate out-movement. However, as was indicated earlier, particular sets of economic conditions cannot be posited as unfailing predictors of high or low levels of out-migration from communities. Elsewhere (Hugo 1981a) it is shown that socio-cultural influences such as community ties, village norms and community-based social networks often have an important influence upon whether or not the operation of economic and economic-related factors initiate mobility. The following propositions are largely derived from the evidence presented in that study where they are developed in greater detail.

5 'In general more traditional communities, stressing close family, kinship and community ties, will experience less out-migration, *ceteris paribus*, than those where individualistic achievement is emphasised' (Bilsborrow 1981: 8). Ritchey (1976) has put forward the following three hypotheses that relate to the impact of community ties on migration and shows how they tend to be supported by studies drawn from the developed world and they appear to have some validity in the Third World.

- (1) The *affinity hypothesis* suggests that where such ties are strong migration is constrained. Third World evidence supports this (Hugo 1981a: 196–200), but also shows that in many such communities out-movement from the village may not necessarily be associated with a severance of localized ties. Where a temporary out-migration strategy is adopted (as is the case in much of the Third World) these ties can be maintained.
- (2) Ritchey's *information hypothesis* suggests that the distant location of family and friends of villagers first encourages and second directs migration by increasing the awareness of potential migrants from the community of conditions, especially job opportunities, at the destination. There is strong

support from the Third World literature (Hugo 1981a: 200–2).

- (3) The third or *facilitating hypothesis* states that the distant location of family and friends of villagers encourages and directs migration by increasing the potential of villager migrants for adjustment at the destination. Again studies of Third World communities (Hugo, 1981a: 202–3) generally report findings which support this hypothesis.

A further hypothesis that is added to those put forward by Ritchey is labelled a *conflict hypothesis* (Hugo 1981a: 203–4). There is a substantial body of literature, especially from Africa and the South Pacific, which suggests that intra-community friction of one kind or another is a significant determinant of out-migration. This may occur in heavily patriarchal communities which stifle the initiative and ambition of younger members of these communities. Also it is suggested that community loyalties have a role not only in retarding or stimulating movement but also in influencing the type, distance, permanence and impact of mobility, should it occur.

6 'Migration is more likely from communities that have a history of migration and/or customs necessitating migration of some of its members' (Findley 1982: 280). In many Third World contexts the effect of the dominant norms, beliefs and values within communities in retarding or facilitating migration are frequently overlooked. Connell *et al* (1976) have suggested that in some communities the social function of migration has come to outweigh the economic aspect in that there may be alternative non-migratory solutions open to movers to improve their income, but they are not considered because migration has become habitual in that community. Among others, Germani (1965: 161–2), Mitchell (1959: 31), and Mabogunje (1970: 5–6) have drawn attention to the importance in the development of migration theory of recognizing the institutionalized roles, expectations, and behaviour patterns against which individuals and groups perceive and evaluate city or village attractions and repulsions (Hugo 1981a: 205). In West Java there are a range of formal and informal institutions within the community which influence mobility behaviour (Hugo 1981a: 206). One of these is the complex body of *adat* (customary law) which regulates many aspects of day-to-day behaviour and varies in content from community to community. The most extreme cases of this normative pressure are where out-migration has become a *rite de passage* for particular groups in a community. Mitchell (1959: 34) questions whether community norms exert any independent influence at all on migration decision-making and suggests that they only reflect

more fundamental causes, but much of the literature would suggest that in many cases norms do have a role in retarding, facilitating or channelling population movement.

10.5 COMMUNITY-LEVEL EFFECTS AND THE CONSEQUENCES OF MIGRATION

There has been a general neglect of the role of population mobility as an independent variable explaining social, economic and demographic change within communities. Yet as Bilsborrow (1981: 8) points out, 'most of the community factors that influence migration decisions are in turn altered by that in or out migration'. Space constraints will limit the consideration that can be given to community impacts of migration, but a few points should be made. Population movement impinges upon communities in one or more of three ways:

- 1 First, adjustment must be made in many areas of life to the permanent or temporary absence of out-movers.
- 2 Secondly, adjustment must be made to the permanent or temporary presence of in-movers.
- 3 Thirdly, adjustments are made to the reciprocal flow of money, goods, information, ideas and attitudes which are initiated along the linkages established by movers between origin and destination.

The nature and extent of the change initiated by population movement in the mover's community of origin is a function of the scale of movement, the duration of absence of the mover and the degree and nature of mover selectivity.

Some examples of areas of population mobility impact upon communities in Third World contexts considered in more detail elsewhere (Hugo 1982e) are briefly summarized below.

1 The impact of mobility upon the general economic prosperity of the community is a function of the effects of the withdrawal (where out-migration occurs) or addition (in in-migration communities) of labour and the extent of in-remittances and out-remittances. There is disagreement in the literature on this issue. Lipton (1980: 3) maintains that 'The sparse evidence suggests that *net* remittances are quite small relative to village income, are concentrated on richer village households unlikely to suffer from capital constraints, and tend to be little used to finance investment, except in housebuilding'. Griffin (1976: 359), on the other

hand, suggests that 'internal migration is likely to improve the distribution of income in rural areas ... Migration, in effect, enables the peasantry to overcome the imperfection of the rural credit market by creating opportunities to amass finance capital in the cities for subsequent investment in agriculture'. Clearly the economic effects of population movement vary greatly from community to community.

2 As well as the active impact of movers remitting the fruits of their destination employment and extracting out-remittances from their place of origin, they exert a passive impact on the origin community by virtue of their sheer absence. For out-migration not to have a detrimental impact on origin production, the marginal productivity of labour must be zero. If a woman or man is able to migrate without jeopardizing the productivity of the area from which they withdraw their labour, then the incomes of those who remain must be increased because the same amount of productivity is shared between fewer people. Lipton (1980: 7) has accumulated a body of evidence (much of it from Africa) that demonstrates that out-migration leads to reduced agricultural productivity and a general deterioration of the local agricultural system in villages of origin. However, in densely populated Java where the marginal productivity of labour in agriculture is virtually zero except at times of peak labour demand such as the harvest season, there is little evidence of such a pattern (Hugo 1982c). Some writers have suggested that because migration is generally selective of the more dynamic individuals in the place of origin local entrepreneurial capacity is diminished so that the potential for adoption of innovative ideas to improve established means of production and for introduction of new types of production is also reduced.

3 Of special interest are the impacts of population mobility upon the role of women. Permanent migration is often associated with a separation of the nuclear family from other kin and hence a greater emphasis on the nuclear family, a weakening of wider kinship relationships and a consequent widening of the roles of nuclear family members, especially women (Gonzalez 1961: 1274). Such influences are of particular significance in the light of Caldwell's (1976) identification of such changes as being absolutely critical in the transition from high stable fertility to falling fertility. Where temporary rather than permanent removal from the village is the norm, it is often highly selective of economically active men and separation of these men from their wives and children necessitates adjustments not only within the community at large, but in nuclear family organization and structure. The separation of husband and wife,

often for very extended periods, is of particular significance and in such circumstances women and children often have to take over more and different types of work and other roles than traditionally was the case.

Since many of the effects of migration (especially indirect effects) are experienced and responded to by the entire community (migrant and non-migrant households) rather than individual households, it is vital that a community level is introduced into the analysis of migration impacts.

10.6 WHAT IS INVOLVED IN A COMMUNITY-LEVEL APPROACH TO THE STUDY OF MIGRATION?

Given the significance of the social milieu in which individuals live in affecting migration behaviour, how have community considerations been incorporated into migration studies? Freedman (1974a: 5) has made the basic distinction between two basic types of community variables:

- 1 Global variables — characteristics of the community for which corresponding measurement cannot be made for individuals, eg presence or absence of a school, distance from the nearest city etc.
- 2 Contextual variables — aggregation of individual measures which describe aspects of the context in which the individual lives, eg mean level of education in the community.

The adoption of a community-level approach therefore involves the identification and, in some cases, the measurement of relevant global and contextual variables which have a significant influence upon, or which undergo significant change as a result of, population movement. Superficially then it would appear that the community-level approach would simply involve appropriate aggregation of individual or household survey data to form contextual variables and examination of centralized data banks, analysis of village records and interviewing a key respondent to measure global variables. However, this is only one (and not necessarily the most desirable one) strategy among several to incorporate an examination of community effects into a study of population movement. The strategy adopted of course will depend on the purpose of the study, its scale etc, but the starting point must be an explicit incorporation of the community in data collection and analysis. This will often mean a

modification of conventional survey design procedures — especially in relation to sampling.

Studies of community-level effects on migration are generally conceived as being of two polar opposite types. On the one hand is the anthropological approach of a highly intensive field study of a small cohesive community in which the researcher lives, observes and participates in the community (eg Chapman 1975), and thereby obtains both 'a detailed knowledge of the daily life of the community members and a degree of empathy which will encourage an understanding of the motives and feelings underlying behaviour' (Hull 1975: 96). At the other extreme are movement registers for the current and at least the previous year and others for sequences of up to 20 years.

Moreover, the Indonesian Central Bureau of Statistics has initiated a programme to build up centralized region-based data banks. Computerized integrated data files were set up for Indonesia's 100 regencies and municipalities in 1975 (Biro Pusat Statistik 1975) and they contain a large number of variables and indicators relating to population, religion, health, education, labour force and employment, communications, agriculture and other economic and social elements. This is being taken a stage further at the 1980 census with the collection of data for a series of variables and indicators at a community level. This set of data will be of major interest and use in the examination of migration and urbanization in Indonesia and is known as *Potensi Desa* (Village Potential). It was collected for each *desa* and comprises information regarding the situation in that village with respect to 20 separate sets of criteria (Suharto 1980: 80–1), namely

- 1 geographical location and situation
- 2 general information
- 3 education facilities
- 4 health facilities
- 5 places of worship
- 6 social organization
- 7 land ownership
- 8 land utilization
- 9 last year's harvest data
- 10 household enterprise information
- 11 commercial crop enterprises
- 12 fishing and livestock information
- 13 ownership of agricultural implements
- 14 factories, storage and processing enterprises
- 15 credit organizations
- 16 transport facilities
- 17 communication facilities
- 18 electricity

- 19 finance of village activity
- 20 village development

This set of information is stored in a data bank and opens up for the first time the possibility of analysing many of the structural characteristics of all communities in various size categories and in various regions across the country. With respect to migration it allows of course some potential to analyse the association between various community characteristics and the incidence or non-incidence of population mobility of various kinds. The data bank will provide an excellent sampling frame for future community-based studies relating to population mobility. Some earlier attempts have been made to compile such a comprehensive data bank relating to *desa*. In the 1970 census a questionnaire asking for ten basic characteristics of *desa* was applied but response to it was poor and the data were never released. However, the 1973 Agricultural Census and the 1976 Inter-Censal Survey collected some comparable information so that in selected areas there may even be possibilities of limited time series analysis. The *Potensi Desa* is the large-scale national survey where a fixed format questionnaire or check list of characteristics is completed for each of a large number of communities in which individual respondents are sampled and that data is related to the appropriate sampled individuals or households (eg see Findley 1982).⁷ While these two approaches are both of considerable importance it must be pointed out that a range of other strategies between these two extremes have been successfully used to identify and investigate community-level effects on population movement. These generally attempt to combine a little of the depth of understanding which comes from some detailed local knowledge and observation and face-to-face contact with village communities, with something of the wider range of conditions and greater representativeness that can be obtained in large-scale migration surveys. There is, of course, the possibility of falling between two stools with the resulting study reflecting the weaknesses of both approaches — unrepresentative place-specific results with too great a degree of superficiality. However, it is argued here that

careful, informed application of a community perspective in such middle-level studies can be productive of insights into the causes and effects of migration. To illustrate this the methodology of a study of population mobility in 14 *desa* in West Java conducted by the present writer (Hugo 1975; 1978)⁸ will be briefly outlined. It is maintained that many aspects of this approach can be usefully applied to larger-scale demographic and migration surveys carried out at national or large-region scale.

The first way in which a community-level approach was adopted in the West Java study was in a four month intensive field reconnaissance where more than 80 *desa* in a wide range of ecological and geographical contexts throughout the province were visited by the researcher who conducted extended semi-structured discursive interviews with local key informants and data from village-maintained registers was collected and analysed. This reconnaissance emphatically indicated that the context in which migration decision-making took place was very influential in that decision-making. Hence it was decided at an early stage that individuals and households should be interviewed within selected rural communities rather than sampling individuals over a wider region regardless of local patterns of social organization. Hence the first purpose of the reconnaissance study was to identify the main types and patterns of population movement between village and city in West Java and the main origins of migrants to cities, as a basis for purposive selection of a small number of case study villages which were reasonably representative of these patterns. More intensive studies were later conducted in those villages. However, this reconnaissance phase had a second and perhaps more important purpose — to familiarize me with the groups which I was going to study, their patterns of movement and the forces impinging upon them before I designed the survey research instruments. As recounted elsewhere (Hugo 1975: 1982c) this led to a complete recasting of the survey design and the drafts of questionnaires which had been formulated after several months' intensive reading of the migration literature and extended discussion with city-based officials and academics in Indonesia. If a conventional Western-derived migration questionnaire were to have been used in the study, it would not only have not

⁷It should be mentioned in passing that if this combined approach is adopted it necessitates communities being explicitly incorporated as sampling units and the sampling procedures would have to ensure that there is a sufficient number of individuals or households surveyed within each community so that the sampled individuals will adequately represent community residents in the construction of contextual variables. (For a discussion on these issues see Findley 1982: 283.)

⁸An elaboration and modification of this approach was adopted in a study of population mobility to and from 16 villages and 8 cities in 8 of Indonesia's provinces conducted by Dr Ida Mantra of the Population Studies Centre, Gadjah Mada University and the author with several Indonesian colleagues. The results of the study are currently being analysed.

collected data on many of the forces shaping population mobility in West Java, but it would have systematically excluded much of the mobility (which is non-permanent) itself. Reconnaissance at the community level would thus appear to be an essential preliminary to any large-scale demographic survey. However, as Caldwell, Reddy and Caldwell (1982: 223) have pointed out, this element of classical survey methodology has been largely abandoned in the last two decades with the proliferation of 'package' universal questionnaires.⁹ They conclude that 'Most surveys would benefit enormously, and become much more scientific, if preceded by a substantial period of micro work undertaken by the principal investigators and not contracted out. Surveys suffer from inadequate questions embodying fallacious assumptions, but far more they are impaired by questions not asked and not even suspected as being necessary.'

Thus the adoption of an intensive community-level approach during the reconnaissance phase of a migration study would seem to be valuable, even essential, regardless of the scale of the investigation. How, then, can community-level influences be detected and studied in the data collection itself? In each of the West Java study villages the major data collection effort was the application of a questionnaire to a stratified¹⁰ random sample of 100 households in the village (Hugo 1978: 123–6). Aggregation of data from these households allowed the development of contextual community variables. However, there were additional efforts made in the field to collect information on community-level influences, and especially on global variables. These included the following:

- 1 Within the selected villages a special 'community questionnaire' was designed to gather community-level data to be used with household and individual survey data to analyse the causes and impacts of population mobility in the *desa*. The data was collected from *desa* records and from interviews with village officials and other key local informants. The primary concern in the questionnaire was with global variables, although some data overlapped with that collected in the household questionnaire which proved useful in checking the extent to which the sampled households were representative of the

community as a whole. Many of the questions were open-ended, although Bilsborrow (1981: 26) maintains that 'any final questionnaire to be implemented in a significant number of communities should have both questions and response categories fixed to avoid laborious office coding'. While my experience has not been with application of community questionnaires in very large scale surveys and I would strongly support the closing of questions where the full range of responses can be anticipated, I would resist the dogmatic closing of *all* questions. I have found that the additional insight and greater depth of understanding provided by the richness of detail and unanticipated responses obtained from the inclusion of a small number of carefully worded open questions in community questionnaires is well worth the extra time taken to code them. More general prototype community questionnaires for migration surveys have recently been put forward and discussed by Bilsborrow (1981) and Findley (1982).

- 2 A second strategy to obtain insights into community-level influences upon migration in the West Java study was to apply a questionnaire to a panel of major formal and informal leaders. These were selected after spending some time in the village and identifying the most influential *bapak* (patrons). The existence of a small group of leaders who have a strong influence on the decision-making of the population at large via a complex network of patron/client-type relationships is an important feature of West Javan village communities (Hofstede 1971; Jackson 1971: 226). Data from these special leader interviews was kept separate from that collected from the random sample of respondents. Of course the interpretation of these data must be careful and tempered by the knowledge that such leaders usually occupy the upper levels of the local political-economic power structure which can produce biases in responses based on the self-interest of the respondents. Nevertheless, the leader interviews were almost always successful in obtaining a large amount of valuable contextual information concerning village population movement.
- 3 Further important insights into community-level influences in the West Java survey arose from the chief researcher living in the village during the period of data collection and conducting a significant proportion of the formal interviews personally. This was an unexpectedly rich source of information and understanding not only through direct observation of day-to-day village life but by taking every opportunity to engage in informal (but

⁹Such questionnaires are extremely useful when utilized in the way their designers intended – ie purely as a base which is to be modified and amplified in accordance with local conditions before use in any individual area. However, too often the packages are uncritically adopted virtually intact.

¹⁰Village households were divided into two strata – those which had members who had ever moved out of the village (movers) and those containing only stayers.

focused) discussion with community members from a wide range of backgrounds. Caldwell *et al* (1982) have discussed in some detail this approach in which 'The major instrument for studying change turns out to be the long, discursive, semi-structured conversation which may go on for hours'. My experience in Indonesia duplicates theirs in that the voluminous field notes taken as a result of such conversations were at least as important as knowledge gained from the migration literature and migration theory in forming my interpretation of the data collected in the formal survey.

The approach of the West Java study obviously is somewhat specific to that particular context and to the scale of study undertaken, but some elements could and should be incorporated in larger scale studies. There has been some suggestion that community-level considerations can be accommodated by the simple 'piggy-backing' of a brief, highly structured community questionnaire which obtains an inventory of local services, transport availability, agriculture and other production, etc onto a conventional large-scale migration survey. However, this is not sufficient if such considerations are to be adequately addressed. The community needs to be explicitly considered in the entire design of the survey so that it is one of the basic sampling units used in obtaining a sample of households and individuals. Several communities should be studied in some detail in the planning stages of such studies before the survey instruments are designed. There is also a range of options open in the collection of community-level data during the survey. In particular, with care, imagination and use of local knowledge, community questionnaires can be designed to be much more than local inventories of basic village economic and social characteristics. The prototype questionnaire developed by Bilsborrow (1981) provides ample evidence of this. In addition, it may be possible to build into the survey design, for at least some of the communities included, more intensive field-based activities to gain insights into the causes and effects of population mobility. Equally important is the necessity of the community being one of the basic units of analysis of data collected from individuals and households.

10.7 INTER-RELATIONSHIPS BETWEEN POPULATION MOVEMENT AND FERTILITY IN THE COMMUNITY CONTEXT

As was suggested earlier, the adoption of the com-

munity as a unit of demographic study and analysis does facilitate examination of some of the complex inter-relationships between population movement and fertility. Too often these inter-relationships are ignored in studies of fertility behaviour and change in that behaviour. However, the demographic response in a community to particular ecological, social or economic circumstances may be multi-phasic as Davis (1963) has shown. Such relationships often are brought into sharper focus in community-level studies. This is because it allows a clearer specification of the context of the decision-making to be made and assists in establishing whether particular fertility or migration changes tend to be discrete alternatives or occur in combination.

Freedman (1974a: 9) also warns that population mobility cannot be overlooked as a possible confounding or complicating factor in examining community effects on fertility. He quotes the following example to illustrate this: 'If poorly educated women have distinctively low fertility in a predominantly well educated community, this may be the result of community influence, but it may also arise because the poorly educated women who already have or want low fertility are selectively attracted to such an area. Does the community select or produce the low fertility?' Clearly it is important to include a consideration of migration in fertility studies at both individual and community level so that such complexities can be unravelled.

The role of population mobility in effecting social and economic change in a community is obviously of critical significance in the examination of fertility change. The possible role of population mobility in the maintenance of stable high fertility in pre-transitional societies and in the initiation of the transition to lower fertility (in the context of Caldwell's theory of life-time net inter-generational wealth flows) has been discussed elsewhere (Hugo 1983a). Although our present understanding and knowledge of the linkages between population movement, wealth transfers and fertility is very limited, a few propositions were tentatively advanced. First, it would appear that initially the onset of high levels of population mobility in a community, especially temporary mobility, may provide additional supports for the maintenance of stable high fertility in pre-transitional societies. This is due to the fact that mobility permits an extension of the geographical area over which the community can send its members to search for work, the proceeds of which are channelled via traditional linkages back to the community-based family to ensure a pattern of life-time net inter-generational wealth flows favouring parents over children. The critical point here of course is that parents no longer are restricted to examining the

income-producing opportunities available in the local community when deciding upon the size of their family. However, it would appear that in many cases this strategy to maintain and even enhance wealth transfers from children to parents contains the seeds of its own destruction in that the spatial mobility may initiate changes within the movers which weakens the village community-based family's control over the use to which the income earned by the mover is put. Population movement, especially that of a more permanent nature, frequently involves exposure to non-traditional influences which may produce in the mover a greater individualism, a stress upon the nuclear as opposed to the extended family and ultimately a challenging of the upward flow of wealth. Such social changes are conducive to a reversal of the net inter-generational flow of wealth. Moreover these changes are not necessarily limited to the individual mover and his/her family but it is characteristic of much of this migration that very strong linkages are maintained by the mover with the community of origin (Hugo 1981a). Thus the occurrence of movement is often a strong influence in initiating a flow of ideas and information and can play a similar role to that attributed by Caldwell to the spread of mass education in initiating challenges to traditional concepts of the family and intra-family relationships. This effect is a community-level effect and not confined to the household or family of origin of the mover, and an understanding of it and its significance is only likely to emerge from community-based studies. It is hypothesized therefore that in the longer term population movement may hasten the transition from stable high fertility to a pattern of fertility decline within communities. The extent to which this occurs will depend upon the nature and extent of the movers' commitment to their community of origin and destination, the degree of control that the village-based family can maintain over movers and the sanctions they can bring to bear upon movers. It would appear that in many cases this control tends to decrease with an increase in the degree of permanency of the move and the duration of absence of the mover.

Thus, in examination of the possible role of increased population mobility in facilitating and encouraging social and economic changes which impinge upon fertility, it would appear highly desirable to adopt a community-level analysis. An examination of migration and fertility purely within families is likely to tell only part of the story. It may be that in large-scale studies communities should be classified according to the level and nature of population movement they experience, the extent to which movers maintain linkages with their villages of origin, etc in attempting

to explain inter-community differences in fertility. Similarly in examining historical changes in fertility within individual communities it would seem necessary to also examine evolution and change in mobility patterns.

10.8 CONCLUSIONS AND DISCUSSION

There has long been a polarization in migration research between a concern with large-scale structural forces which have an overriding influence in shaping the macro-aggregate pattern of population movement and those forces which impinge at a micro level upon individuals and families. However, both approaches only provide a partial and incomplete understanding of the causes and consequences of population movement. Pryor (1975: 37) has pointed out that sooner or later we must deal with the problem of linking knowledge regarding motives at the micro level with inferred causal mechanisms at the macro level. There is a growing feeling among migration researchers that this gap may be bridged at least in part by approaching the study of population mobility from a wider range of levels of investigation. It has been suggested that the community level offers a possible means whereby we can link two groups of causal factors identified by Gardner (1981: 71) as first those which individuals and families can perceive, feel, articulate, relate to and evaluate as pertinent to themselves and their goals, and secondly those less proximate, more basic structural factors beyond the consideration and often even the awareness of individuals but which nevertheless shape migration. Bilborrow (1981: 10), for example, states that 'it is important to have information about both the individual and community variables to investigate the factors that influence migration decisions. Thus the exclusion of community variables in empirical studies of individual behaviour generally results in statistically misspecified models'.

It would seem that the community offers a meaningful and manageable unit in which both micro and macro influences on migration can be considered together. However, the inclusion of community-level variables into the analysis of migration (and fertility) decision-making raises a number of difficulties. Not the least of these is the problem of separation of individual and community effects. Erbring and Young (1979: 397) detail 'the empirical problems of separating the effects of individual attributes from the effects of social context in the determination of individual outcomes'. The body of studies which explicitly consider both

individual and community-level variables in attempting to explain migration behaviour is limited. Moreover, in many of these studies the community-level variables considered are more a function of what data is available from central data collection agencies than the result of any careful development of explanatory hypotheses. As McNicoll has said, in reviewing a study of community effects on reproductive behaviour in the Republic of Korea¹¹ which found that such effects were minor, 'In the tradition of multivariate studies, however, only cursory attention is given to the theoretical justification for the particular independent variables selected — another can always be added — giving a high ratio of tables of beta coefficients to pages of interpretive text'. Obviously the inclusion of particular community-level variables, as with any independent variables, is only justifiable in the analysis of demographic change if there are good theoretical reasons to suggest that there is an explanatory relationship between that variable and demographic behaviour.

There is a need for us to be much more careful in our identification and specification of these community-level variables and also to be less constrained by model community-level questionnaires developed in contexts different to that being studied. Community-level variable data should not necessarily be limited to that which is readily available from centralized authorities. Too often the community questionnaire, where one is used at all, is considered to be peripheral to the main business of data collection from a random sample of individuals and households and too few resources and care are devoted to its design or application. The application of the questionnaire must be fully integrated into the research design and if households can be visited for data collection surely communities can be.

As Bilborrow (1981: 10) has indicated, the community questionnaire is likely to remain the major element in collection of information about most of the community structural-institutional factors that influence migration in large-scale surveys. However, it is also important to consider the possibility of supplementing this with more detailed community-level studies. These should not only be of the 'pilot survey' nature indicated earlier, but it has been argued (Hugo 1982e: 211) that many additional insights into the causes and impacts of population mobility upon welfare, development and inequality would be gained

if large-scale sample surveys were supplemented by detailed community case studies. These studies should be of a 'linked, follow-up' nature in that the communities selected as case studies should be a subsample of sampling units from the large-scale survey. The case study communities could perhaps be selected on a stratified basis (by type of mobility, etc) using the data collected in the larger survey. If this strategy is adopted it will be possible to link the findings of the detailed case studies to those of the more representative wider survey (albeit not in a strictly statistically respectable way) and give them a wider relevance than would otherwise be the case. The advantages of linked datasets are fairly obvious and have been spelled out elsewhere (eg see Khoo *et al* 1980).

The community-level detailed case studies could be especially selected to test specific hypotheses. For example, an area which has undergone substantial rural development could be closely studied to test the hypothesis that such programmes retard rural-urban migration. Another consideration could be to select study areas such that they represent a range of communities according to the time period over which migration has been a significant influence. From individual and household questionnaires it is not possible to discover whether mobility influencing communities is longstanding or recent and it is clear that adjustments to the movement and the nature and degree of impact on the community will vary over time. Such a stratification will make it possible to differentiate between short-term and long-term development and welfare impacts of particular mobility patterns. A further major consideration in the case studies is that there is a need to look closely at the structural causes and impacts of population mobility. This would involve collecting time series information relating to patterns of agriculture, income levels and distribution, institutional changes, access to local employment, investment in productive activity, etc which have occurred over time and investigating whether or not these can be related to migration. In areas of in-migration the impacts on service provision, pressure on housing, job opportunities, etc, can all be investigated in some depth, but always with a linkage to the findings of the wider survey being possible. The case studies will allow a more detailed and explicit assessment to be made of the development impact of migration in specific areas where it is needed. It may also be possible to incorporate more specialized examinations within this framework; these could include the impact of temporary labour migration on fertility levels and the influence of mobility on health (eg that of temporary workers who often have to live in very crowded or unsanitary conditions).

¹¹ In his review of Hong, S. (1979), *Community Development and Human Reproductive Behaviour*. Korean Development Institute. *Population and Development Review* 6(3): 502-3.

A community case study approach would allow more detailed investigation to be made into the influence of mobility on 'modernity', the breakdown of traditional authority and the traditional ways of carrying out day-to-day activities. Similarly, in the examination of the impact upon political participation and political change, observation of patterns in the community and discussion with key respondents in the case studies will almost certainly be more productive than the questionnaire survey.

Thus, the provision for addition of a case-study section to national surveys would add considerable depth to the analysis of impacts of population mobility. At the same time the overall perspective provided by the questionnaire survey will not be lost because the case studies are tightly linked to the larger survey. In addition, it may be that the analysis of other aspects of migration could be enhanced by the adoption of the nested case-study strategy. For example, analysis of the causes of movement or non-movement will be best undertaken in a full knowledge of the structural historical and contextual forces which impinge upon and shape mobility. Such forces as agricultural change, increased capital penetration, land tenure changes, increased commercialization, transport penetration, greater emphasis on individualism over traditional co-operative relations, etc, can often be more readily discerned and examined in community-level questionnaires. However, while such approaches undoubtedly can enrich the breadth of information regarding the impact of migration they do not provide an alternative to the approach suggested here which is aimed at adding more depth via thorough investigation of processes and their precise impacts. In all, the case studies used as a supplement to the larger survey will allow a much more detailed assessment of the net costs and benefits occurring to individuals, families, communities and nations as a result of various patterns and levels of mobility. Large-scale migration surveys provide many insights into population mobility but their value could be enhanced by the addition of another role — that of a framework for more detailed studies.

It has been attempted here to indicate some of the possibilities of adopting the community as a distinctive unit of study in the exploration of the causes and effects of changing patterns of population movement in Third World situations. It is argued that the context of demographic decision-making exerts a significant influence in shaping that behaviour. In many developing world situations the community constitutes a valid and manageable unit within which to analyse contextual effects in conjunction with individual variables. The

neglect of contextual factors in analysis of demographic behaviour has resulted from a preoccupation with the individual as a unit of study, especially in large-scale studies. It is virtually impossible to gain an adequate view of the context of decision-making using such strategies in research design and analysis. Nevertheless it has been possible here to advance a number of, albeit tentative, propositions linking changing migration behaviour to community effects. These are indicative of the fruitfulness of incorporation of considerations of community in studies of population mobility. However, the inclusion of a community perspective must be carefully conceived and fully integrated into the research design and not simply be a check-list of community characteristics and facilities collected as an after-thought. There are still problems, which are daunting in number, scale and complexity, in collecting and analysing such data, not to mention integrating it with that collected at individual and household levels. However, the results thus far achieved are encouraging and suggest strongly that this approach offers one avenue in which our understanding of demographic change can be significantly improved.

While the preceding sections have dealt predominantly with community-level variables impinging upon migration and in turn being affected by it, much of what has been covered is of relevance to the study of change in reproductive behaviour. This is true not only of methodological considerations but also of some of the actual structural variables considered. If we know little about the effects of macro-structural institutional forces upon changing patterns of migration, the same can certainly be said for the study of fertility. Finally, it should be reiterated that the community-level perspective has pointed to the important complex interrelationships between changing patterns of fertility and those of migration. The clarification and understanding of those linkages remains an important but neglected priority in demographic research, and one in which the community is a highly relevant unit of analysis.

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11 The Nature of Institutional and Community Effects on Demographic Behaviour: A Discussion

Geoffrey McNicoll

11.1 INTRODUCTION

The main question to be addressed here is: how do community or institutional factors affect demographic behaviour? The subsidiary question is: how do we find out? Lurking in the background in this discussion, although dominating the rest of the Seminar, are the WFS Community Module (see Freedman 1974) and the new statistical weaponry of contextual and multi-level analysis. At the invitation of the organizers, my remarks here are in the form of musings on these questions rather than a detailed commentary on individual papers.

The Seminar starts by being somewhat fuzzy about its subject-matter. 'Community and institutional factors' are left undefined. Part of our task is presumably to clarify what we are talking about. The dependent variables are specified but hardly narrowed down: marriage, contraception, other proximate fertility determinants, and, for good measure, mortality and migration. (The fertility outcome itself seems somehow to have escaped – a situation that the recent obsession with intermediate variables in the field of fertility studies has made familiar.) Hence I feel fairly unconstrained in ranging across the theoretical landscape in these comments. I will first try to pin down 'institutional and community effects' as I understand them; next take up some issues that arise in the incorporation of such factors in theories of demographic change; then, specifically in the fertility case, consider how the array of knowledge we have at hand (as reflected especially in the papers presented in this session) fits together and where it points for future empirical efforts.

11.2 INSTITUTIONS AND COMMUNITIES AS SOCIAL FACTS

The premise that I think we all share is that demo-

graphic behaviour, like the rest of human activity, cannot be understood wholly as the outcome of material circumstances (including biological circumstances), nor wholly as a manifestation of cultural patterns and personal idiosyncrasies. Explanation, thus, is bound to involve an uneasy mixture of sources. Moreover, since the material and the ideal in some part determine each other, a range of arbitrariness exists in what serves as adequate explanation – although reduction to the tangible, wherever possible, is for most people the strategy that carries the most conviction.

Yet it remains true that the demographic behaviour we are chiefly interested in is individual behaviour. To a varying but fairly large extent it is voluntary behaviour. Whatever the 'objective' conditions in which it takes place, it is how these conditions are apprehended by the individual that presumably determines their influence. We seem to be led back to individual characteristics and perceptions, the stuff of the survey-taker. Institutions, communities, cultures, all dissolve into a background, to be filtered through the eyes of our respondents.

This narrowing of focus can be readily seen in the recent course of demographic research. 'Classical' demography was essentially a macro-level subject, like geography. The classical tradition led smoothly to transition theory, to human ecology and gravity models of migration, and to the Coale-Hoover style of modelling economic-demographic linkages – areas that were still active objects of interest in the 1960s but are well on the sidelines today. Few students of population, in fact, now seem to have any interest in such mundane subjects as population size or structure: the relevant datasets are kept alive by the United Nations – a commendable activity, we can agree, but not any longer worth much attention in the discipline. In short, the interest of researchers, especially in the case of fertility, has shifted, rapidly and overwhelmingly, to the individual level – to questions of individual attitudes and behaviour and to what goes on in people's heads.

Two sets of factors promoting this state of affairs can be pointed to. The first is the influence of the American survey research tradition exemplified by the US National Fertility Studies and, at a different level, by the KAP surveys that buttressed family planning programmes around the world in the 1960s. Together, I suppose, these parented the World Fertility Survey. Advances in computing power and facility have multiplied the number of analysts of each dataset; a clean WFS tape can support several PhD dissertations. Where the data are, there, in the present scheme of things, go the graduate students, pulling the discipline after them.

The second cluster of forces promoting individual-level research are the strongly-felt influences of neighbouring disciplines: human capital theory in economics and its progeny, the new home economics; decision theory of various stripes and attribution theory in psychology; and the orientation toward multivariate statistical analysis in sociology. In the case of psychology the emphasis is, of course, built into the subject; in the cases of economics and sociology, the evident facts that fertility behaviour is lodged in individuals and that a mass of concrete data exists or can be easily generated has attracted scholars of a particular bent, carrying with them only a limited range of disciplinary interests. (Migration research, perhaps because migrants interact more tangibly with larger organizational realities as they move across the landscape, seems to have been somewhat less confined in this way.)

I do not want to be misunderstood here as simply redrawing the familiar contrast between methodological individualism and holism. As a programme, the former has much to recommend it. The urge to seek explanations for social phenomena in the attitudes and motivations of individuals is a healthy corrective to reification, misplaced concreteness, anthropomorphism, and other such sins of the loose-living social theorist. Successful explanations of social facts in terms of people's intentions, beliefs, dispositions, and so on, seem to have a finality to them, a down-to-earthness. If explanation, as the dictum has it, is where the mind comes to rest, why not rest here?

The limitations that I believe characterize the programme of the new home economics (at least in its Beckerian phase) and much recent work of sociologist-demographers in studying demographic behaviour stem not from their common assumption of methodological individualism but rather from their inadequate incorporation of socio-economic and cultural 'structure'. I will try to expand on and illustrate this point.

Consider first the economic case. The basic postu-

late here is of a stable, continuously differentiable, individual utility function. The Lancaster-Becker finesse was to replace tangible goods and services as arguments of this function with 'basic wants' — the actually-desired consequences of purchasing goods: child services rather than a crude number of children, prestige rather than perquisites, health rather than dumbbells or doctor's visits, sensual pleasure rather than . . . , and so on. The differentiability assumption precludes any awkward interruptions to a fully-marginalist analysis — to any structuring, in other words, of the internalized decision environment. The individual, or the household treated as a quasi-individual, is in turn embedded in a simple exterior environment of price signals. While attention is paid to household allocations of time and effort, family organization is a given rather than an explicandum.

The micro-economic approach to fertility is not wholly cut off from institutions: in particular, via its alliance with growth theory and, lately, with mathematical demography it can explore some important aspects of inter-generational transfers, and it could (though as yet it does not) analogously explore intra-generational (lateral) transfers. Both, of course, in highly stylized fashion.

I mean this as commentary, not criticism. Concentration of attention on a limited domain — in this case, intra-family allocational responses to changes in technologies or relative prices — is of course necessary for useful research to be conducted. It is objectionable only if inordinate claims are then made that ignore that initial narrowing of focus. But the differentiability conditions that are so automatic to guild economists do assume away a host of questions that to my mind are central for understanding fertility.

Before getting into these, let me mention the corresponding problem on the sociological side. Here the marvels of modern statistical technique, with only slight exaggeration, can virtually eliminate the need for serious *a priori* theory construction. The variables are there, filled out with data; the analyst's task is to find a path model that makes sense of them. Box diagrams are cheap, and wastebaskets in population research centres must be filled with discarded efforts. Whereas for the micro economist analytical modelling of fertility is smoothly channelled by neo-classical substitutability assumptions, for the quantitative sociologist in this field analytical modelling does not have to be practised at all.

I argued above that limitations on theoretical scope in determinants research were wholly appropriate — this is the familiar 'middle-range' notion. Yet a tacit presumption that governs quite a lot of theoretical work in the area seems to be that we are all engaged in

building an edifice that will ultimately be *the* theory of (say) fertility or migration — though perhaps needing labour over generations, like a mediaeval cathedral. Thus described the enterprise sounds overweening, even absurd. But I think the idea is quite widely held: it implies in effect that the correct task of the theorist is to graft on additional bits of explanation to the structure that already exists, elaborating details, occasionally adding new spires or digging new catacombs. Whether a particular addition is a buttress or a gargoyle might on occasion be in dispute, but not the essential nature of the enterprise as the cumulative elaboration of the theory. The more modest and I believe more realistic research objective is selectively to bring into focus and illuminate particular facets of demographic behaviour, cumulating insights and contingent, partial explanations at a variety of levels without high expectations that the whole will exceed the sum of the parts.

For the present Seminar the facets calling for theoretical scrutiny are twofold: first, the external societal setting in which individuals, separately or in families, are placed — in other words, the communities and institutions that are the immediate subject of this meeting; and secondly, a corresponding internal environment comprised of categorized 'facts', beliefs, and procedures — the locus of cognition and, in some sense, culture. In attempting to bring each into focus, it may be necessary to ignore or coalesce the surrounding demographic complexities that attract so much current interest and attention — in particular, often, the biological system that has been neatly explicated in recent work on proximate fertility determinants; and to elide the process of decision-making — while keeping distinct the decision contents. The biological randomness and psychological idiosyncrasy at the individual level that eat so heavily into the variance available for statistical interpretation can also be left aside — at least until we come to data collection issues.

At this point it is necessary to be clear what we mean by 'communities and institutions' in the context of demographic behaviour. To most of us a disparate array of things probably comes to mind: neighbourhoods, villages, clans and factions; labour arrangements, property rights, family law, local administrative systems, and so on. The list could be extended considerably — indeed, to include potentially any of the manifold uniformities of behaviour patterns that provide the predictability which makes social intercourse possible and that generate the categories and social arrangements confronting us in everyday life.

If we require a formal definition, let me cite Eisenstadt's: 'Institutions ... are regulative principles which organize most of the activities of individuals in

a society into definite organizational patterns from the point of view of some of the perennial, basic problems of any society or ordered social life' (Eisenstadt 1968: 410). A somewhat looser definition is typically used by economists: the set of behavioural rules governing action or relationships in specific recurrent situations. Communities, which with little loss of generality we can confine to local territorially-defined groupings, are potentially significant entities in influencing individual behaviour (*qua* community) to the extent they are 'institutionalized'. Any supra-family territorial grouping is also of course a possible site of 'global' and 'contextual' effects, in Lazarsfeld's usage: members share certain commonalities in exposure to a local environment (cited by Freedman 1974: 5). The instance of mortality determination is an especially obvious example, but more subtle contextual influences can be conceived on fertility and migration behaviour.

Let me underline what I am saying here, since I think it is easy to blur the distinction between 'community level' and 'community'. The subject of this Seminar, I would argue, covers two things that share little in common: first, community-level variables (that is, global and contextual variables), and secondly, institutions. Neither of these seem to hinge on the concept of community in the usual organic sense of the term. Social pressures for conformity, if they lack the sanctions that tend to go with institutionalization, would be true 'community effects' — but I would guess it is pretty rare for these to be determinative in practice. (Typically, though, elite informants exaggerate community amity and forget to mention the sanctions.) Paradoxically, social pressures perhaps play more of a role in urban areas, where neighbourhoods tend to be more homogeneous by social class.

11.3 'OBJECTIVE' INSTITUTIONAL ENVIRONMENTS OF DEMOGRAPHIC BEHAVIOUR

With these preliminaries out of the way we can return to the initial question of the nature of institutional and community effects. Consider separately the two areas I distinguished above: the 'objective' institutional environment in which individuals are placed and the cognitive environment that is the immediate context of individual decision-making. (This is not to suggest that the two are not aspects of the same reality or that particular research studies would not be strengthened by attempting to take account of both.)

The usual simplifying assumption made in focusing on the institutional setting is that individuals are

straightforward utility maximizers with stable and consistent preferences — unproblematic actors and price-takers. Research attention can then be directed to the nature of the demographic incentives set up by particular sets of institutional arrangements. In the fertility case, we would be interested, for example, in how labour market structures influenced the potential economic contributions of children to the family and the opportunity costs of raising children; the extent to which financial institutions play an effective role in family asset management and in smoothing consumption levels over adult life; and generally in how well the society can assure the rule of law and contract, and thus the predictability and reliability of extra-familial relationships.

The first step in understanding institutional effects on demographic behaviour is to draw an accurate picture of these arrangements, based not on formal organizational charts or prescribed functions but on how things actually work. Surprisingly, perhaps, in many situations this is not something that can be found ready made or that can be easily put together out of some equivalent of the Human Relations Area Files. At a fairly crude level the constituent materials typically can be assembled from existing anthropological studies; it can then sometimes happen that a convincing demographic explanation virtually falls into the researcher's lap. More detailed description and more firmly-based linking of institutional forms with behavioural outcomes calls for intensive *ad hoc* study. As excellent but methodologically very different examples of the latter I can do no better than to cite Mead Cain's series of studies of rural labour institutions in Bangladesh, and the interview-based reconstruction of changing social organization and its outcomes in rural South China by Parish and Whyte (see Cain 1979; 1981; and Parish and Whyte 1978).

Of course, in these cases the linkages with demographic behaviour are circumstantial. They would be less so if a corresponding link could be found between individual transactions (assumed to be unproblematic) and the institutions in question. Forging this second link (though not usually in the area of demographic behaviour) is the subject of an increasing amount of research both by the so-called new institutional economists and by methodological individualists in sociology such as Raymond Boudon. (See, for example, Williamson (1979), Ben Porath (1980) and Boudon (1982). The general issue in the demographic context is discussed briefly in McNicoll (1980).) The programme seeks a logic of institutions derived from a logic of individual transactions; it is generating, I think, some of the most interesting work currently being done in either discipline. The programme is

especially well suited to explicating institutional change induced by new resources or technologies. If it has a weakness it is perhaps to over-rationalize — to exaggerate the present-time consistency of institutional arrangements, rather than allowing for strains and contradictions and odd survivals from the past that may call for deeper levels of explanation and an historical dimension. It also inclines one to deny any autonomy to these arrangements: there is a temptation simply to regard institutions as induced phenomena, like interference patterns, without determinative influence on behaviour — so great is our fear of misplaced concreteness. Yet everyday experience surely is just the opposite; the subservience of behaviour to these supposed chimeras. The belief that institutions are merely the instruments of their leading participants is a sort of conspiracy theory of the world that seems to me every bit as naïve as the opposite extreme.

The picture I have drawn here is of the institutional setting of a demographic regime as a kind of mediating structure in part sustained by individual interests (including some in non-demographic spheres), in part historical residue, in turn creating the patterns of incentives that influence demographic outcomes. It should be added that the whole is loosely articulated, by no means free of inconsistencies, and undergoing important changes as new technologies are adopted and new resource flows appear. A monographic analysis of a particular situation can sometimes briefly encompass these complexities and present a persuasive account of demographic change (or explanation of the absence of change). Even the charge of circumstantiality can be countered to some degree by judicious use of natural or counterfactual experiment. The value of such broad-spectrum analytical endeavours is self-evident, both as knowledge of the special case and as raw material for comparative analysis. An accumulation of these studies does not substitute for comparative analysis, however. For the latter purpose, the selective focus and development of contingent explanation, referred to earlier, is the indispensable route.

11.4 COGNITIVE ENVIRONMENTS OF DEMOGRAPHIC DECISIONS

Accurate depiction of institutional settings and dynamics, however nuanced and historically rooted, does not complete the analytical task, although it can carry us quite far. To stop there would be to concede too much of the variance of demographic behaviour to statistical noise — allowing that irreducible residue of

biological and psychological randomness to be swelled by a component that potentially is in part accessible to social research. For fertility in particular (migration may be a somewhat simpler case), the convenient preference set assumptions (consistency and stability in particular) that are made in order to concentrate on the tangible exterior setting may prove inadequate. *A priori* there would seem to be plenty of reasons to expect so. To strain a metaphor, a lot more goes on in people's heads than meets the eye.

What is called for to fill out the picture is an effort to structure the cognitive environment of decision-making in demographic behaviour, just as the analysis of the institutional setting structures the objective environment. The assumption is that perceptions of the objective environment cannot be taken for granted, since they are coloured by culturally assigned meanings. Here we encroach on the turf of cognitive psychology and anthropology — which most demographers do with great trepidation: we tend to be a pretty stolid lot. My guess is that any anxiety over this incursion is misplaced and is created, perhaps, by those elaborate psychological models of decision-making that make it a source of wonder that any decision can ever actually be taken. But, as I said earlier, the decision process seems to me a prime candidate for simplification.

A singularly fruitful working hypothesis to take in with us is one suggested by Herbert Simon, who intruded into the system of cognition many years ago. To Simon, 'a man, viewed as a behaving system, is quite simple. The apparent complexity of his behaviour over time is largely a reflection of the complexity of the environment in which he finds himself ... both the world apprehended through the senses and the information about the world stored in long-term memory' (Simon 1981: 126–7). For us this memory would include the collective memory that is culture.

In the case of demographic behaviour, then, we can readily accept a simple utility maximization model as the kernel of choice, but would embed it in a cognitively-structured setting. The research task is to explore that setting and try to locate its sources of stability and change. Where does the 'moral economy' intrude and put bounds on simple maximization behaviour? (That it does so nowhere for a subject as socio-culturally central as reproduction seems highly implausible; migration, on the other hand, is altogether more prosaic.) How do contents of other dimensions of the cultural system generate continuities or directions of change in fertility behaviour different from those dictated by the economy and social organization, and how are such strains then resolved?

I have suggested how such a framework could in principle accommodate various common interpretations of fertility transition (McNicoll 1983). For example, the 'Coale transition' (that is, the shift from natural to controlled fertility in response to cultural change that widens the application of a simple economic calculus). (In effect, this is the now widely used Easterlin model. For its basic form, see Easterlin 1975.) Or again, the 'Chicago transition' (a cutback in fertility demand resulting from a straightforward rise in the relative cost of children, typically associated with an increasing value of time — taking place without any influence from changing cognitive structures). Or thirdly, the 'Caldwell transition' (a cognitive shift, associated with new ideas and economic realities, in which children, from being associated with parental — and especially patriarchal — consumption, come to be linked instead to patterns of sentiment within the nuclear family group). The transition may of course differ in kind among different cultural groups or social strata, introducing additional research complications.

How do we go about investigating what sort of transition we are dealing with? First, I think, by recognizing that demographers are no better positioned or fitted for the task than investigators in neighbouring fields who lack the tangibility of our dependent variables. Analogous issues can be found at the frontiers of social psychology and cognitive anthropology. The former, for example, has itself moved on from its earlier concentration on attitudinal research to the investigation of people's perceptions of the structure (including the causal structure) of their social worlds. Anthropology has overlapping interests. Van de Walle's dismissive remark that 'anthropologists have been notoriously incapable of explaining fertility differentials, except in the vaguest terms', true enough of the past, may well not be indicative of where the next advances in understanding fertility will come from (van de Walle, chapter 6, p 107). As examples of recent efforts in other fields to elaborate cognitive structures and their determinants, see Rosch (1977) and Wilder and Cooper (1981). Demography, in fact, has remained for the most part stuck with attitudes. Perhaps this is because of a tacit, though none the less egregious, assumption that our theory is established; more likely, it is because attitudes can be recorded by survey instruments — for a marginal extra investment of effort, since surveys are needed anyway to pin down the hard demographic facts — whereas more subtle perceptual relationships cannot: losing survey-based data-processing options is too great a sacrifice for an uncertain gain beyond the safe territory of significance testing.

11.5 PRACTICAL RESEARCH ISSUES

If I have spent too long talking around the subject of this session without coming to grips with the practical issues of empirical research in the area, my excuse is that much more often the emphasis is reversed. In taking up some of these practicalities I shall tangentially discuss the five session papers – not seriatim, but through treatment of themes and identified problems that in some sense cut across them. The papers' focus on different proximate fertility determinants and different demographic variables unfortunately narrows down these commonalities. Moreover, the authors clearly each came to a somewhat different understanding of the organizers' terms of reference. To take just the three fertility-related papers, van de Walle (chapter 6) was led to a discussion of community-level variables and their limitations in tropical Africa; Hermalin (chapter 7) gives us an unreconstructed brief for multi-level analysis – modestly proposed as a solution to the problem of reconciling the survey tradition in demography with intensive community studies; and the Caldwells (chapter 8) prepared a daunting propositional inventory in the Berelsonian mode on several of the seamier proximate determinants – supplemented by a discussion of practical difficulties in collecting data on community influences on such matters. Little common ground here. But some major procedural differences can be read into these contributions, and into the comprehensive research strategies proposed for community and institutional influences on mortality by Hobcraft (chapter 9) and on internal migration by Hugo (chapter 10).

A recurrent theme is what survey instruments can and cannot do, and whether other instruments can be found to supplement or replace them. Any discussion of this must clearly be premised on agreement as to the nature of the linkages being investigated. Consider first contextual effects. There can be no doubt, for example, that KAP (knowledge, attitudes and practice) issues concerned with the accessibility and use of family planning and health services can be helpfully explored through a household survey. The means by which a structural model can be set up and estimated to trace out individual and community-level determinants of demographic behaviour, the latter derived by aggregating individual data, is recounted by Hermalin (chapter 7). Impressive statistical ingenuity is here applied to the case where use of fertility regulation is the explicandum, but the same techniques can in principle treat other situations where contextual influences are likely: nuptiality, breastfeeding, use of health

services, migration behaviour, and so on. The elaboration of causal structure entailed in this approach is a clear advance in survey analysis.

Global variables of the sort that have been collected in the WFS community-level questionnaire can be incorporated into this analysis with no difficulty. For the most part it is simply a matter of convenience to collect such data centrally rather than at the household level: the presence or absence of a health clinic, for instance, could be treated globally or contextually, but there are evident economies in asking a question only once. (Differences between fact and perception, however, may often require both routes to be taken.) But global variables ('characteristics for which a corresponding measurement cannot be made for individuals': Freedman 1974: 5) are not confined to geography and infrastructure; they extend to a community's location in a wider political and administrative setting and to its social and economic organization – subjects where a conventional questionnaire format can barely scratch the surface. And when the dynamics as well as the statics of the setting are of concern, wholly different data-gathering strategies are called for.

Nearest to a community-module approach appears to be the kind of rapid-fire assessment of community settings that Hugo carried out in the course of his research on short-run migration in Indonesia (as recounted in chapter 10). A skilful and experienced observer focusing on a narrow set of issues can quickly characterize pertinent aspects of the local situation, trading off routinized formal comparability for flexibility in pursuing promising leads. Again, however, the approach is more suited to explicating community-level variables than institutional determinants. More elaborate methods have been devised for so-called 'rapid rural appraisal' of rural economic conditions and agricultural sector programmes.¹

Focus group approaches, entering the population field from commercial market research and thence acceptability studies of contraceptive methods, are another option. They are potentially a rich source of material on recent social history and local institutions.² Lengthy structured interviews need not, of course, be restricted to panel settings: the Parish and Whyte study

¹On rapid rural appraisal, see *IDS Bulletin* 12(4) (October 1981). The methods are data-intensive and designed to be sensitive to local patterns of social organization. There can also be purely qualitative 'anecdotal appraisal' of the kind illustrated by Critchfield (1981).

²As applied to contraception see the contributions to *Studies in Family Planning* 12(12) (December 1981). Chayovan and Knodel (chapter 15) discuss panel interviews as ways of reconstructing village social histories.

of China, referred to earlier, shows how individual informants can fill in a detailed picture of community structure and institutional change — one, moreover, that is suited to quantitative analysis (Parish and Whyte 1978). For a less formal approach, probably more suited for cultural analysis, see the study by Bell (1979).

Dropping attempts to be formally representative allows for much deeper study of institutional workings. Immersion by an investigator in one or a small number of communities is the approach advocated by the Caldwells (chapter 8) and (with a converging argument but somewhat different recommended methodology) by Cain (chapter 14). The findings of these investigators and the results of a few other intensive village studies have been a signal empirical contribution of the past decade to understanding demographic behaviour.

Perhaps the most important dimension along which one can carry empirical research and researchers is what might be called the level of parametrization — to use that ugly but essential word. At one extreme, to put it crudely, you go to the field with a complete theoretical structure in mind, needing data only to estimate your model. At the other extreme you go with an open and receptive mind, stocked with tentative hypotheses and possibilities but essentially uncommitted — hoping for both model and parameter values to be formed simultaneously on immersion in reality. There is a whole range of intermediate positions between these extremes, and there are attractive iterative strategies that move between them. Demographers, perhaps because they have so firmly in mind the age-time structure of population dynamics, and now also the biological structure of proximate determinants, tend to locate themselves near the former end. If they had similarly neat and robust models of family organization the effect would be even more pronounced. What goes wrong, it seems to me, is that with all this structure around (and who can deny its existence?) there is already enough supposed theory in hand without looking any further. Thus the very different kinds of structuring I have been discussing here — applied to institutional settings and to cognitive environments — get short shrift. I have no difficulty myself accepting a fairly high degree of parametrization, provided that the theoretical structure is well focused, tailored to specific issues. One such issue is, for example, the role of contextual variables in contraceptive use. Quite another is the problem for which van de Walle finds surveys unhelpful: fathoming the 'institutional rationality' of a demographic regime (in his case, particular marriage systems) and identifying the forces that may make for a shift in regime (chapter 6, p 104).

The other end of the spectrum of *a priori* theorizing and parametrization is of course represented by studies such as those recently undertaken by the Caldwells (see especially Caldwell *et al* 1982; 1983). The richness of their empirical work in Africa and South Asia over two decades we are all familiar with, and its shift away from a survey tradition towards what they call a quasi-anthropological approach. It verges at present, I think, on an institutional equivalent of Geertz's 'thick description' — layers of motivations and considerations are uncovered in a way that makes the survey-taking enterprise look naïve in the extreme. But this amount of complexity is also a bit discomfiting to others — I include myself at least by inclination — who seek understanding in part precisely by simplification, by rigorous exclusion of detail and use of simple modelling (whether formal or qualitative). The answer, I assume, is that the field needs its Caldwells; it also needs its analytical modellers; and most of all it needs continuing dialogue between them.

One final comment. It should be a fairly unimportant matter, over the longer haul, how insights on social change and its demographic ramifications are generated. It is a concern of intellectual history, detached from the substance of those insights. The latter should be valued or not depending on its power to make sense of events elsewhere in time or place, with appropriate adjustments for historical context. Canons of 'sense' may vary, but disagreement should diminish as one gets closer to predictive tests. In the social sciences such tests are rare enough to be startling.³ That they are not yet found in the subject area we are discussing is no great surprise. It is however ground enough for methodological modesty.

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Part III

Issues of Sample Design and Data Analysis

12 Cross-Level Analyses

Hubert M. Blalock

12.1 INTRODUCTION

Sociologists have long been aware that inferences that cross-cut two or more levels of analysis are, at best, risky and, at worst, misleading. Ever since Robinson's (1950) classic paper warned us of the so-called 'ecological fallacy', sociologists have been reluctant to cross the 'great divide', as Irwin and Lichtman (1976) have put it. Yet there has been extensive literature implying that the difficulties are indeed complex but not intractable. What does not seem to have occurred, however, is any really systematic programme of empirical research designed to address a series of questions that need to be tackled if successful cross-level analyses are ever to become useful models for others to follow.

The early responses to Robinson suggested that he may have overstated the case. Duncan and Davis (1953), Duncan, Cuzzort, and Duncan (1961), and Goodman (1953; 1959) all dealt with the problem of making inferences about individual-level associations on the basis of aggregated data. Duncan and Davis, for example, pointed out that lower and upper bounds for individual-level correlations can be obtained from aggregated data, though such bounds will usually be very broad ones unless the aggregated data are based on units of analysis that are relatively small. Goodman's work pointed to the fact that regression coefficients at the individual level may be estimated from macro data, provided one is willing to make certain restrictive assumptions about the homogeneity of the individuals being aggregated.

This earlier work concerned with the 'ecological fallacy' was paralleled by a number of discussions of 'structural effects' (eg Blau 1960) or 'contextual effects' (eg Davis *et al* 1961) that seemingly dealt with a different problem, namely the question of how macro- or group-level variables may be incorporated at the individual level as explanatory variables in the same equation system as micro-level variables. The subsequent debate over such contextual-effect models has also produced a number of important insights that will

be reviewed below. Also, a series of discussions that have approached the aggregation-disaggregation problem from somewhat different though mutually complementary perspectives have shed important light on the relationship between the 'ecological fallacy' problem and this literature on contextual effects.

Since the writing on these topics is both technical and widely scattered, non-methodologically inclined demographers and sociologists are apparently unaware of their implications for cross-level research. In particular, I infer that many sociologists are not familiar with the extensive literature on these subjects that has developed in political science. One of the purposes of the present paper is to summarize, in a non-technical manner, some of the most important points that have been made in these diverse bodies of literature.

Equally important, however, is the need to explore some of the many practical implications that these methodological discussions have for empirical research. In a nutshell, virtually all of these discussions imply a considerable need for careful conceptualization and attention to design details before one's data have been collected, aggregation decisions made, and analyses carried out. As will become readily apparent, the complications in cross-level analyses are many, and it will almost inevitably be the case that data gaps will require investigators to substitute untested assumptions for empirical evidence. Given the expensiveness of the necessary data-collection operations, and the need for co-ordination if data must be collected by different parties, it becomes essential that researchers be aware of the import of this methodological research.

In spite of the rather discouraging implications that stem from these methodological discussions, the potential pay-off for cross-level research is tremendous. After all, most sociologists believe that the real world is complex and that individual behaviours are influenced by contextual variables. We also believe that human actors differ in specifiable ways and therefore, by implication, should not be treated alike and either

grouped together or presumed to respond similarly to particular stimuli.

We shall see that the implications of the technical literature point in exactly this same direction; they tell us that we are likely to be misled if we force unreasonably simplistic assumptions on our data analyses. For instance, if we are unwilling to assume similar responses among actors, we should not impose a constancy assumption on our regression slopes, and if we do so, we may be expected to make incorrect cross-level inferences. Thus some of the conclusions that have been reached on the basis of these technical arguments are highly compatible with common sense. But they are also a considerable refinement of it and often indicate the degree to which biases will occur under specified conditions. Furthermore, they often alert us to certain complications we would not otherwise have anticipated.

12.2 AGGREGATION: BIASES, GAINS, AND ASSUMPTIONS

Rarely would we expect theories appropriate in explaining individual behaviours to have simple analogues at macro levels. Yet we commonly encounter instances in which macro-level measures are summarizing measures of micro variables, and we also notice that theoretical arguments often pass back and forth between levels, sometimes in highly confusing ways. Thus, one may use a series of macro-level variables to explain differential birth rates, while at the same time employing psychological assumptions about the motivations of individual actors. Sometimes we visualize people as acting in a co-ordinated fashion, whereas in others we see strictly individual behaviour, though influenced by similar environmental factors. If we are not forced to state our theories in equation form, or to give precise definitions to our terms, we are often not very sure just what level we are operating on. And in many instances our theories will be at the individual level, whereas our data will only exist in aggregated form.

We cannot understand the complexities involved, however, unless we start by formulating highly simplistic models to see just what they imply. Let us begin by assuming that we have individual actors who are placed in several different contexts, with the behaviour of the i th individual in the j th context being represented by Y_{ij} , and the several individual characteristics by X_{1ij} , X_{2ij} , and so forth. To be specific, suppose we have a three-variable individual-level equation

$$Y_{ij} = a + b_1 X_{1ij} + b_2 X_{2ij} + e_{ij} \quad (1)$$

where we may assume large enough N 's to ignore sampling error, and where we assume the model is correctly specified so that the disturbance term e_{ij} is uncorrelated with either of the micro-level independent variables.

Now assume that we also have a 'corresponding' macro-level theory, appropriate to the contextual units j , of the form

$$Y'_j = A + B_1 X'_{1j} + B_2 X'_{2j} + e'_j \quad (2)$$

where we again assume, temporarily, that this theory is also correctly specified, with the disturbance term e'_j being uncorrelated with both X'_{1j} and X'_{2j} . Suppose, also, that we have three aggregating functions through which Y_{ij} is linked to Y'_j , X_{1ij} to X'_{1j} , and X_{2ij} to X'_{2j} . In what sense can we talk about the theories at the two different levels as being 'consistent'?

Notice that we may arrive at predictions about the macro-level dependent variable in two ways. First, we may use our aggregating functions to transform each of the individual-level variables into a macro-level counterpart, and we may then use equation (2) to obtain the dependent variable. But we might have also proceeded by obtaining the separate individual-level values Y_{ij} using equation (1) and then taking the individual-level dependent variables and aggregating them to obtain the Y'_j scores. As noted by Hannan (1971), econometricians (eg Green 1964) have defined the notion of consistency across levels to mean that these two procedures for obtaining Y'_j should give identical results, apart from sampling fluctuations. This indeed seems a reasonable definition of consistency, for if the two procedures did not give the same results, one would wonder about the adequacy of the model.

Under what conditions will consistency obtain? First, it will be necessary that all three kinds of equations be linear. That is, not only must equations (1) and (2) have linear formats — as, indeed, we have constructed them — but the aggregating functions must also be linear. For instance, if the macro-level counterparts to the micro variables are all means or proportions, this condition will hold, but not if they are measures of dispersion or even medians. In the discussion that follows we shall assume we are dealing with aggregating functions that are group means, so that the primes in equation (2) can be replaced by means (eg Y'_j by \bar{Y}_j).

Secondly, the coefficients of each term must be genuine constants, which implies that individuals must be homogeneous with respect to their responses to changes in the independent variables. This is an

absolutely crucial assumption which has a number of important implications, as we shall later discover. Whenever actors are expected to differ with respect to their responses it implies that they should not be aggregated, or at least that we may anticipate biases whenever this inadvertently occurs.

Thirdly, if the independent variables are not fixed but are themselves subject to influences that are beyond the control of the investigator, we must also be concerned about the covariances of these variables with the disturbance term. Even though the micro model may be well specified, with these covariances approximately zero, the method of grouping may affect the covariances at the macro level, producing aggregation biases of varying magnitudes. In particular, if individuals are grouped according to any criterion that belongs in the equation for Y_j , or that is correlated with a variable that belongs in that equation but that has been ignored, we may expect aggregation biases in instances where the micro model has been perfectly specified. If it were possible to group cases either randomly or according to one of the included independent variables, such a bias would not occur (Blalock 1964; Hannan 1971), but in practice such 'pure' types of grouping operations are extremely unlikely. More commonly, individuals will be grouped according to proximity or organizational criteria, with such rather simple operational criteria being related to both independent and dependent micro-level variables in complex and poorly understood ways. If so, aggregation biases will ordinarily occur. Whether or not they amplify or diminish any specification errors that have been made on the micro level will depend upon a number of circumstances, some of which will be noted below. (See Irwin and Lichtman 1976; Langbein and Lichtman 1978; Hannan 1971; Hannan and Burstein 1974; Hammond 1973; Burstein 1978; and Blalock 1979.)

Furthermore, our micro equation (1) does not contain any macro-level variables, as for example a group mean on either X_1 or X_2 . If it did so, then we would have an instance in which a 'non-corresponding' macro variable appeared in an equation for the micro dependent variable Y , and it has been shown by Theil (1954) that such non-corresponding terms are responsible for aggregation biases or departures from consistency. As we shall see, Firebaugh (1978) has made the point that a rather simple criterion for determining whether or not there will be aggregation biases is that of deciding whether or not \bar{X} (for any of the micro-level independent variables) belongs in the equation for Y_{ij} . If it does, we may anticipate aggregation bias. Thus the Firebaugh criterion is compatible with the argument that there can be no (non-

negligible) non-corresponding variable effects in any of the equations. (See Hannan 1971)

Finally, Irwin and Lichtman (1976) have stressed that whether or not the biases produced by aggregation amplify or reduce any specification errors that may exist at the micro level depends, importantly, on how well the two theories have been specified at both levels. If we pre-suppose a perfectly specified micro model but improper specification at the macro level, we may rather naturally expect aggregation biases and would therefore prefer the micro model. But we must also allow for the possibility that our macro theory may be better specified than the micro theory, especially when we admit that many micro-level variables have not been measured, or perhaps have been measured with considerable random measurement errors that could be cancelled out through aggregation. A major implication of their discussion is that without adequate theories at both levels it will be virtually impossible to say very much about the relative magnitudes of the errors involved.

Let us now consider some specific kinds of models that have been treated in these several methodological discussions. Suppose first, that the micro model of equation (1) is correctly specified and that we are somehow able to group individuals according to their X_1 scores, putting together those with the highest scores, those with the next highest set, and so forth down to those with the lowest X_1 scores. We would find that this method of grouping retains almost as much variation in X_1 but reduces the variance in the disturbance term in accord with the Law of Large Numbers. Our correlation between \bar{X}_{1j} and \bar{Y}_j would be greater than the counterpart individual-level correlation, but the slope estimate would have the same expected value, and in this instance the estimates using both the micro- and macro-level models would be unbiased (Blalock 1964). We would lose in efficiency, however (Hannan 1971). Our estimate of the slope linking \bar{X}_{2j} to \bar{Y}_j would also remain unbiased, though the correlation between \bar{X}_{2j} and \bar{Y}_j would depend on the micro-level correlation between X_1 and X_2 . In grouping by X_1 we would affect the variance in \bar{X}_{2j} relative to that in the disturbance term, but if our two independent variables were only very weakly related at the micro level, grouping by X_1 would be almost tantamount to a random grouping as far as X_2 was concerned.

Next, suppose we were to group by a proximity variable, which we will symbolize by A (standing for area). If A were a cause of either or both of X_1 or X_2 , but did not belong in the equation for Y , we would not produce a (non-zero) covariance between \bar{Y}_j and the aggregate disturbance term, and our macro-level estimates of both slope coefficients would remain

unbiased, though again we would lose in terms of their efficiencies as compared with their micro-level counterparts. (See Irwin and Lichtman 1976.) More generally, if our grouping criterion does not belong to the micro-level equation for Y , our macro-level equation will not be misspecified.

But suppose we were to group our individuals according to their levels on the dependent variable Y . As I have shown elsewhere (Blalock 1964), this will tend to confound the effects of the included independent variables with those that have been omitted. Suppose, for example, that one component of the micro disturbance term is due to the variable Z that is uncorrelated with X_1 and X_2 . Suppose that all relationships are positive. In putting together high values of Y we will also be putting together cases that are high on Z but also X_1 and X_2 , making Z correlated with \bar{X}_1 and \bar{X}_2 in the macro model. But since Z is taken to be unmeasured and included in the disturbance term, this disturbance will become correlated with the included independent variables at the macro level, even where it is uncorrelated at the micro level. We will have misspecified our macro model and introduced an aggregation bias that, in fact, will increase with the sizes of our groupings. Illustrative data for a somewhat simpler model of this type are provided in Blalock (1964), where it is shown that the resulting biases may become severe and the conclusions reached highly misleading. The effect will be to give credit to the included variables for the effects of the omitted variables with which they have become confounded, so that almost any selected independent variable can be made to look good. Selecting extremes with respect to the dependent variable, without aggregating, will have the same kind of effect, as will the selection of cases that have changed in opposite directions on a dependent variable in a time-series design.

We do not ordinarily group by dependent variables, though it does seem more common — especially in macro-level studies in which cases are selected on a judgemental basis — to select extremes on a dependent variable. But when we group by proximity we may be grouping either by a variable that belongs in the equation for Y or that depends upon Y . This is because human actors locate themselves in space through a complex set of mechanisms, and this is especially likely whenever small distances are involved. Some persons will change communities, perhaps even because of the \bar{Y}_j levels within them. An even greater proportion will move about within a community, and still more will choose their friends on the basis of self-selective mechanisms that are highly complex. The essential point is that without a theory as to why individuals are located where they are, we will not be in a position to specify the appropriate causal model for relating our aggre-

gation criterion A to the other variables in the equation. We can be almost certain that there will be some specification errors involving the confounding of measured and unmeasured variables, but we will not know the extent or sometimes even the directions of the biases.

All of this seems to suggest that aggregation — especially aggregation by spatial proximity — will amplify any specification errors that may exist in the micro model, and indeed Hannan and Burstein (1974) argue that this will ordinarily be the case. But there may be some special circumstances under which the aggregation biases may work in the opposite direction from specification biases, producing a net aggregation gain (Firebaugh 1978). Irwin and Lichtman (1976) make this point in illustration of their major argument that it is the relative magnitudes of the specification errors at the two levels that is really at issue. Suppose, for example, that the correctly specified micro model is equation (1) but that we have mistakenly omitted X_{1ij} . If our two micro-level independent variables are uncorrelated with each other, there will be no specification error produced, although our new disturbance term will have a greater variance. But to the degree that X_1 and X_2 are correlated, our micro-level equation involving only X_2 will be misspecified and our estimate of b_2 will be biased.

Now if we were able to group cases in such a way as to reduce the magnitude of the correlation between the unmeasured X_1 and the measured X_2 we would expect to gain through aggregation, since there would be less specification error of this type. How likely would this be if we were to aggregate by proximity? This would depend upon the signs and the magnitudes of the micro-level relationships among A , X_1 and X_2 . Several possibilities come to mind. If spatial location is a common cause of X_1 and X_2 , which would otherwise be unrelated, then we would have the model of figure 12.1. Here, if one were to *control* for location, say by looking at relationships within areal units such as communities or neighbourhoods, we would expect the micro-level relationship between X_1 and X_2 to reduce towards zero, since A is producing a spurious relationship between them. Unfortunately, however, if we *group* by A we do the opposite of controlling for A ; we produce group means that differ considerably across our spatial units, while reducing the variance in the remaining causes of X_1 and X_2 . We will increase their correlation, so that if we omit X_1 in the macro model as well as the micro model, we will amplify the micro-level biases. (Of course if we were able to include \bar{X}_1 in our macro model, though omitting it from the micro model, we would only be left with a collinearity problem at the macro level.)

It is possible, however, that there is an additional



Figure 12.1

mechanism connecting X_1 and X_2 at the micro level, such that the sign is opposite to the effect produced by A . Suppose, as in figure 12.2, that X_1 is a direct cause of X_2 , but one that would produce a negative relationship, whereas A produces a partly spurious positive effect (net of the direct link between them). If so, the total association between the two micro-level independent variables will depend on the magnitudes of the direct effects. Possibly the effect of A may not be strong enough to wipe out the relationship at the micro level, but by aggregating we may increase this spurious component sufficiently to produce a near-zero relationship between them at the macro level. Now if we were to omit X_1 at both levels, we might possibly obtain a better specified model at the macro than at the micro level. Irwin and Lichtman (1976) provide a somewhat more formal set of criteria under which such aggregation gains may indeed occur. Keeping in mind that different sets of data may be available at the two levels, and that we cannot always assume a perfect specification at the micro level, their point is well taken.

To summarize, it is essential to pay careful attention to the nature of the aggregation criterion and how this may be related to the other variables in the theoretical system at both levels of analysis. One ordinarily expects aggregations to produce greater specification errors at the macro than at the micro level, though there may be some circumstances under which aggregation gains may occur. But whenever the aggregation criterion, such as spatial proximity, enters into the models in complex ways that are poorly understood, it will be extremely difficult to assess the resulting speci-

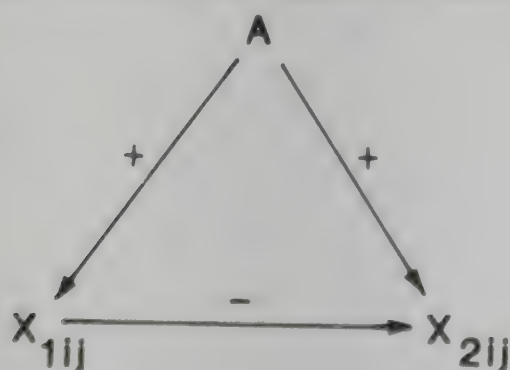


Figure 12.2

cation errors at the macro level. For this reason alone, it is highly desirable that the investigator have control over the aggregating process, so that micro data can be retained and analyses conducted at both levels. Where this is not possible, it becomes crucial to develop explicit alternative models in which the aggregating criterion A appears in the macro theory and in which temporal sequences are clearly specified.

12.3 CONTEXTUAL-EFFECTS MODELS

We shall deal here with situations in which consistency across levels is not expected, owing to the fact that at the individual or micro level some of the independent variables refer to macro processes that are presumed to impact on the individual, over and above the effects of individual-level variables that may be operating. These macro-level variables may be what Lazarsfeld and Menzel (1969) referred to as 'global' variables that are not simple summarizing measures of micro variables, or they may be group means for micro-level independent or dependent variables. In the case of global variables, as for example a variable that refers to religious values, political rules, or a geographic characteristic of the area, one may simply tack on a set of dummy variables to represent the effects of such variables or perhaps utilize several interval-scale macro variables that have no correspondence to an individual-level counterpart. For instance, the behaviour Y_{ij} of the i th individual in the j th group may be affected not only by a set of X_{ij} 's, but by a number of characteristics of that j th group that may also be inserted into the behavioural equation.

The type of contextual-effect model that has given rise to a number of debates, however, is one in which the macro variables included in the micro equation are, themselves, means obtained by aggregating over some subset of individuals, usually the entire group. In the most simple additive case involving only a single individual-level independent variable X_{ij} and a group mean \bar{X}_j the contextual-effect model takes the form

$$Y_{ij} = a + b_1 X_{ij} + b_2 \bar{X}_j + e_{ij} \quad (3)$$

where e_{ij} is an individual-level disturbance term. Such an equation, of course, represents an instance where a non-corresponding macro variable \bar{X}_j belongs in the equation for Y_{ij} , and we have seen that in such situations (Firebaugh 1978; Hannan 1971) consistency across levels is not to be expected. This may also be seen from the fact that if we aggregate individuals

within each of the groupings, we obtain the macro equation

$$\bar{Y}_j = a + (b_1 + b_2)\bar{X}_j + \bar{e}_j \quad (4)$$

for which separate components of $b_1 + b_2$ cannot be distinguished. At the macro level, then, the effects of the individual-level variable X_{ij} and the group mean \bar{X}_j will be confounded. Put another way, if we were to estimate b_1 for the micro equation using macro data, we would obtain a biased estimate unless $b_2 = 0$.

Many of the disputes that have arisen in connection with contextual-effect models of this sort are basically similar to those encountered whenever two or more explanatory variables are intercorrelated. Some of these disputes will be reviewed subsequently, but here it is sufficient to point out that the high degree of collinearity between X_{ij} and \bar{X}_j will often make it difficult to resolve such disputes by empirical means. Other disputes, however, involve matters of precisely how the model should be specified, just what theoretical variables are represented by the group mean contextual variables, what the implications of omitting either other micro- or macro-level variables may be, and whether or not all of the micro variables should be entered into the equation before the macro variables are included. Also, there have been discussions of non-additive joint effects and non-linearities and just how these are to be interpreted. On top of disputes of this nature, there are concerns about just what kinds of contextual units to use and the implications of improper specifications resulting from an unwise choice of contextual unit.

Thus, the contextual-effects literature contains debates that really do not raise new methodological issues but merely address familiar ones that have plagued sociologists in many ways. But there are some matters that are peculiarly relevant to this type of model, and it is these that will occupy our attention in the present section. These include the proper choice of contextual unit, situations involving either nested or overlapping contexts, the causal ordering of micro- and macro-level variables and how this relates to the question of self-selection, and the nature of specification problems that may arise whenever group means are used as indicators of the 'true' contextual variables thought to belong in the correctly specified model. It will come as no surprise to sociologists to discover that many of these issues obviously involve conceptual ambiguities. Also as expected, at least some of the disputes seem to have stemmed from intellectual predilections favouring either a micro- or macro-level explanatory theory.

Common features of contextual-effect models

Let us now examine some common characteristics of contextual-effect models, with a view to stating them in somewhat more general terms.

- 1 The dependent variables are taken to be individual-level variables, usually behaviours, that may also be of interest as structural variables at the macro level. Thus at the micro level the dependent variable may be either a behavioural level, for example the number of deviant acts or number of childbirths, or perhaps a propensity or probability of behaving, as for example committing suicide or giving birth within a specified temporal period. At the macro level these individual behaviours may then be aggregated to produce behaviour rates.
- 2 The independent variables consist of at least one micro-level variable and at least one macro-level variable. The most commonly discussed case is the one implied by equation (3) in which the macro-level variable is a group mean on the same independent variable, although the case where the contextual variable is represented by the group mean \bar{Y}_j on the dependent variable Y_{ij} has also been discussed. Clearly, however, there may be any number of micro-level independent variables and any number of aggregated variables represented by group means, including means on variables that have not been included at the micro level.
- 3 The equation may be a simple additive one, in which case it is common to refer to the effects of the macro-independent variables as being 'independent' of the micro effects, though they will ordinarily be correlated with them. Equation (3) of course represents a very simple instance of such an additive model. But there may also be a number of different kinds of non-additive joint effects, only a few of which have been discussed in the literature. Following discussions by Davis *et al* (1961), Boudon (1967), Valkonen (1969), Przeworski (1974), Sprague (1976), Blalock and Wilken (1979), Boyd and Iversen (1979), and Hermalin and Mason (1980), one may represent the coefficient b_1 in equation (3) as a variable that is a function of the group mean \bar{X}_j , thereby obtaining what amounts to a single equation involving the product term $X_{ij}\bar{X}_j$. Boyd and Iversen (1979) develop an extensive treatment of such interactive models, pointing out that they may either be represented by a single equation containing the interaction term multiplied by a separate constant b_3 , or by a pair of equations, one of which is of the form of

equation (1) and the second of which takes b_1 as a function of \bar{X}_j . (A similar argument could be developed by taking b_2 , the coefficient of \bar{X}_j , and expressing it as a function of the individual-level variable X_{ij} .)

These arguments can obviously be extended by (1) allowing for interactions among a number of different micro-level independent variables; (2) allowing for interactions among several contextual variables; and (3) allowing for interactions among non-corresponding micro- and macro-variables, as for example X_1 and \bar{X}_2 . Given the flexibility of the general linear model, a wide range of alternatives may be considered, though substantive interpretations of many such possible models might become problematic.

- 4 It has been recognized that macro-level variables could be represented by dummy variables, and interaction terms involving these dummy variables, or (equivalently) through a covariance analysis. Such a procedure results in a greater 'explained variance' (Firebaugh 1979) but also uses up a considerable number of degrees of freedom if the number of distinct contexts is at all large (Langbein and Lichtman 1978). More importantly, it does not assist much in the process of finding theoretical explanations of the mechanisms producing the contextual effects (Farkas 1974), except as a point of departure or an exploratory check as to whether there may be any macro-level effects worth isolating. Boyd and Iversen (1979) present a series of cogent arguments for preferring a more definitively specified model involving \bar{X} terms over such a dummy-variable approach. Hermalin and Mason (1980), however, recommend a search strategy that first concentrates on selecting the important micro-level variables by looking within contexts but using dummy variables (or covariance analysis) to locate intercept or slope differences among these contexts. Contextual variables may then be used, in a second stage, to explain these intercept and slope differences.
- 5 There may be either nested or overlapping contexts. In the former case, contexts are embedded in successively larger ones, as, for example, classes within schools within districts, or departments within sections within larger organizations. In the latter type of situation, the contexts that are relevant to any one actor will constitute a partly overlapping set with the contexts appropriate for another actor. For instance, a wife may have a set of friends who partly overlap those of her husband's, but her work, religious, or family context may involve still different sets of actors. Thus we may find, in the extreme, that no two actors can be characterized by the same contexts. If so, aggregation decisions will almost certainly lead to specification errors as one or another type of context must be ignored and questionable homogeneity assumptions made.
- 6 The authors may not be homogeneous with respect to slope coefficients or the weights attached to each of the contextual variables, just as they may also not respond in identical ways to changes in their individual-level characteristics. Their attachments, dependencies, and vulnerabilities will ordinarily be expected to vary across contexts, and the more numerous the non-overlapping contexts, the less plausible become our homogeneity assumptions relating to these coefficients. Where network analysis can be used to delineate actors with distinct roles in networks of different types, it may become possible to attach distinct scores to each actor, rather than using such a simple indicator as an overall or subgroup mean.
- 7 There is no inherent reason why contextual-effect terms need to be confined to group or subgroup means, though other types of measures have been discussed only tangentially. In particular, a contextual variable that may often be of importance to the actor is the homogeneity of the context, particularly with respect to variables that may affect the sanctioning power of the group. Presumably, a highly homogeneous group is in a better position to control its members, if only because there may be few subgroups into which the deviant individual may retreat. Thus it may be reasonable to take at least some of the individual-level coefficients, such as b_1 in equation (3), as functions not only of means but also selected variances. It is likewise possible, of course, that the coefficient of an \bar{X} term may be a function of a homogeneity measure. Some of the coefficients may also be skewed and might be introduced into a model to help account for certain asymmetric influences, as for example social controls that operate to reduce deviance in one direction but not in another.
- 8 We must recognize that contextual variables may operate at different points in time, some continuously and others only intermittently. When we also note that individuals may have changed contexts, as a result of factors beyond their control or as a consequence of self-selective mechanisms, we realize that a study that considers only present contexts may be highly misleading. Furthermore, actors may be in a far better position to self-select themselves into or out of some contexts than others. In particular, contextual influences involving close

friends and other types of primary groups may involve a higher degree of self-selection than community-wide contexts, but the degree to which self-selection operates may also be a variable across settings.

Theoretical and conceptual issues

Given the confusion and debate over the use of contextual-effect models, one may wonder whether they are worth the effort. Consider the following question: Admitting that the coefficients b_1 and b_2 in equation (3) will be confounded if one is forced to use aggregated data and equation (4), namely $\bar{Y}_j = a + (b_1 + b_2)\bar{X}_j + \bar{e}_j$, why does this matter? If one is attempting a macro-level theory involving structural variables such as these group means, then why bother with a cross-level analysis in which the two kinds of independent variables are distinguished? If one could assume the constancy of $(b_1 + b_2)$ across all settings and time periods, perhaps no such distinctions would be needed, or at least a cross-level analysis would merely add frosting to the cake. But it is precisely because we do *not* expect constant coefficients that we not only need to decompose the coefficient $(b_1 + b_2)$ but also need to understand the causal mechanisms involved. Similarly, if we are using an interactive contextual-effects model in which the slope b_j – in the micro equation $Y_{ij} = a + b_j X_{ij} + e_{ij}$ – depends on one or more contextual variables, we will need to specify the appropriate mechanisms in order to write a realistic equation for the ‘constant’ b_j .

One of Hauser’s (1974) objections to unsophisticated contextual analyses that merely tack on dummy variables representing a composite group-level effect is that such an approach represents little more than a ‘residualizing’ effort to explain variance beyond that attributed an individual-level independent variable. As such, the residual ‘contextual’ variable may represent a wide variety of mechanisms, including the possibility that it is merely correlated with neglected individual-level variables or that it is picking up variance associated with those included variables that have been imperfectly measured. Before one begins to infer genuine contextual effects, Hauser argues, many of these simpler alternatives need to be investigated. Basically, the kinds of issues he raises are common to virtually all atheoretical multivariate analyses that rely heavily on ‘explained variance’ criteria for evaluating the contributions of inter-correlated dependent variables. Nevertheless, the objections to poorly specified contextual models are well taken. If one uses dummy-variable or covariance analysis procedures to demonstrate that group-level variables explain addi-

tional variance, one has therefore merely begun the analysis (Hermalin and Mason 1980). As Firebaugh (1979) and others have noted, the insertion of group mean variables is a bit more specific and useful in inferring the appropriate causal mechanisms, but even this device has occasioned a variety of alternative explanations that we shall now briefly examine.

Perhaps the most common interpretation of a group mean effect involves the idea of normative controls or some such notion as a ‘climate’ of opinion, which can only be indirectly measured through a group mean. This concept of ‘climate’ has been invoked and criticized in discussions of school effects (Campbell and Alexander 1965; McDill *et al* 1969), but it also seems relevant when applied to much more micro contexts, such as friendship cliques or classrooms. Przeworski (1974) and Sprague (1976) rely on the somewhat related notion of ‘random mixing’, the idea being that actors’ behaviours are directly influenced by the relative frequency of their contacts with persons of various kinds, both those with characteristics similar to themselves (eg fellow Swedes) or those from another group (eg Finns). Here the idea of norms seems more implicit than explicit, but we presume that normative pressures are a function of the degree to which the actors are exposed to persons having characteristics that can be represented by group means.

Another mechanism through which group means may affect a dependent variable involves some kind of a comparison process, through which the actors compare themselves with others who are characterized by some average level, say of performance. In the case of the so-called frog-pond effect (Davis 1966; Firebaugh 1980), individuals compare themselves with a perceived group mean, often in such a way that the resulting comparison works in the opposite direction from the individual effect. Thus a child having a high level of intelligence might be expected to perform well on a test, or to develop high performance expectations. But if the child is embedded in a context that contains other high IQ children, then in relative terms his or her abilities will tend to be under-rated, and performance or expectations may drop. As Firebaugh (1980) notes, if there are such frog-pond effects at work, in addition to climate or normative ones, the net group-level effect may be diminished. Unfortunately, if the frog-pond and normative effects are additive it will not be possible to separate the two without the aid of strong *a priori* assumptions. An identification problem will exist.

As noted by Blalock and Wilken (1979), contextual variables may operate to affect either subjective probabilities (expectancies) or utilities (values) in such ways as to produce either additive or multiplicative contextual terms. These authors take the position that

a completely specified micro-level model containing all relevant subjective probabilities and utilities would imply that all contextual-effect terms must operate through one or more of these subjective variables and thus would not belong to the micro-level equation for Y_{ij} . However, since a completely specified micro model of this type represents only an ideal, the presence of contextual-effect terms serves as a clue to missing micro-level explanatory mechanisms. This position is compatible with Hauser's (1974) observation that, before making any claims that one has 'found' contextual effects, one should attempt a more complete micro-level explanatory system (see Hermalin and Mason 1980; and Hobcraft 1981). At the same time, however, it allows for the indirect effects of contextual variables, operating on subjective variables at the individual level.

Other authors have stressed that contextual variables may operate differently according to how proximate they are to the individual actors. This point is perhaps obvious but yet has important implications, suggesting the need for multi-level contextual analyses and careful efforts to assess the degree to which self-selection may operate at some levels but not at others, or perhaps via different mechanisms at different levels. For instance, children are sorted into schools on the basis of parental behaviours (eg choice of neighbourhood), into classrooms on the basis of administrative decisions and possibly their own past academic performances, and into peer groups on the basis of their own and their peers' preferences. Clearly, then, the sorting mechanisms as well as the contextual influences are often far more complex than can be assessed empirically, given our data-collection capabilities, so that untested theoretical assumptions will be unavoidable.

For convenience, we may distinguish between two kinds of questions which, in any given instance, may be empirically intertwined. First, one may ask: What factors account for the relative and absolute magnitudes of coefficients such as b_1 and b_2 , given the possibility that all actors will not be homogeneous in terms of their exposure, vulnerability, or sensitivity to contextual variables of one kind or another? The second type of question, in contrast, is concerned with the causal interconnections among individual- and contextual-level variables, such as X_{ij} and \bar{X}_j . Does the contextual factor influence the individual-level variable, say by affecting the individual's attitudes directly, or perhaps by affecting expectancies? Or does the individual-level variable affect that actor's choice of contexts through self-selection, or perhaps by influencing other actors in that context to modify their own behaviours?

In both instances, we must be careful not to assume that all actors in any given setting can be characterized by identical processes. This clearly implies the need for supplementary individual-level data and social psychological theories linking these actors to their contexts. Obviously, if we wish to extend the scope of our generalizations to widely different settings, as for example different countries or communities of varying sizes, the need for such supplementary data and theoretical assumptions becomes all the more crucial.

Consider, as an example, the fertility behaviours of women in widely different settings. (See Freedman 1974; Hermalin and Mason 1980; and Hobcraft 1981.) A very crudely defined contextual variable might be the presence or absence of birth control clinics within a certain distance of their residences. Another might be the average fertility preferences of women in their same age cohort. But the 'exposure' of such women to these two types of factors may depend upon a number of factors, including the influences of close friends and kin, their literacy levels and general awareness of \bar{X}_j in the contextual unit selected by the researcher, and numerous subjective factors affecting their sensitivities to normative pressures. Not only would a simple aggregating of women over an entire community tend to obscure differences among them, but to the degree that the causal processes also differed among them, it would be difficult if not impossible to assess the direction of causation between the individual- and the contextual-level variables. For some, the group mean may have affected the individual-level X_{ij} , whereas for others the causal direction may be reversed, as for example where persons have moved into or out of communities according to their preferences, occupational opportunities, or even the availability of modern health facilities.

Since no data collection efforts can ever be complete, missing information problems are inevitable. Very commonly, personal characteristics considered to be intervening variables in causal models are among these omitted variables. If the assumed models are all linear and recursive, the omission of such intervening variables will not produce misleading conclusions (Blalock 1982). Thus if one assumes that a contextual variable, say \bar{X}_j , affects an individual-level variable X_{ij} , which in turn affects a behaviour Y_{ij} , then \bar{X}_j does not belong in the equation linking Y_{ij} to X_{ij} . But \bar{X}_j is an indirect cause of the behaviour, and one would be correct in inferring that a change in \bar{X}_j will produce a change in the behaviour level. Leaving X_{ij} out of the model will not affect this conclusion or bias the slope estimate for this (indirect) effect. Thus even though b_2 in equation (3) is technically zero since the equation implies that X_{ij} is being controlled, we could legitimately claim that the group mean variable

affects the behaviour, though we might not understand the specific mechanisms involved. Thus in omitting intervening variables from linear additive recursive models we merely sacrifice some understanding of the mechanisms involved.

But if the structural parameters in this indirect causal situation are not constant, if recursiveness does not hold, or if non-linearities are involved, the information sacrificed by the omission of such an intervening variable may turn out to be crucial. For instance, if there are several omitted intervening variables, say two individual-level psychological states, and if there is feedback among these intervening variables, as implied in figure 12.3, then this will affect the relative importance of the contextual variables Z_1 and Z_2 , here taken to be exogenous (Blalock 1982). If this feedback is negligible in one setting, whereas in another it is more substantial, the relative importance of the contextual variables may shift. Similarly, if there is feedback between the 'dependent' behaviour Y_{ij} and some but not all of the individual-level X_{ij} variables, this will affect the relative magnitudes of the exogenous contextual-level variables.

Thus as soon as we allow for reasonably complex causal models involving such feedbacks, it becomes all the more important to specify one's model as completely as possible and to obtain measures of most of the 'intervening' variables. Needless to say, if analysts use models of varying degrees of complexity in this regard, they will reach very different conclusions even using the same measures of the intervening variables. Where the data collector has neglected to supply such information about these variables, it will be impossible to choose among their alternative explanations. If there is a bias favouring the selection of the more parsimonious

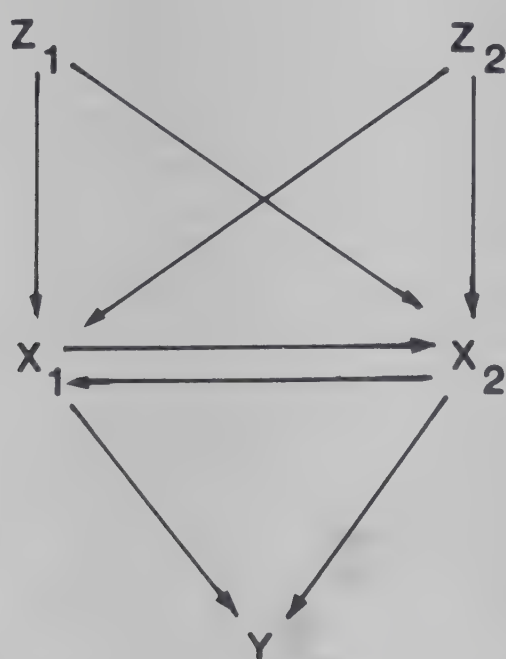


Figure 12.3

theory, we may expect a tendency to rest satisfied with what may be an incorrect or misleading explanation.

The second kind of issue mentioned above concerns the causal inter-relationships among the several contextual variables, as well as among individual-level variables and corresponding and non-corresponding contextual variables. If these causal connections were known and an appropriate causal model constructed, one could obtain estimates of the structural parameters or 'direct' effects, and from these one could then obtain estimates of total effects via different causal paths. Contextual-effect models, however, are especially vulnerable to multicollinearity problems stemming from several sources. First, we may expect high correlations between X_{ij} and the corresponding \bar{X}_j terms, and this will be especially true to the degree that contexts are homogeneous on these variables. In general, the smaller the contextual unit and the more similar its members, the more serious the multicollinearity problems and sensitivities to measurement and sampling errors. To the extent that individuals select their contexts, we may anticipate substantial multicollinearity problems of this nature.

But multicollinearity among contextual variables is also likely, though these may be alleviated somewhat by careful attention to design considerations, as we shall discuss in section 12.4. If a small number of geographic areas are selected for study, for example five or six rural villages, one is very likely to discover high inter-correlations among those contextual variables that are strongly influenced by geographic factors that affect the local economy in important ways. Indeed, it may be hard to locate communities with differing levels of many important contextual variables. If so, the inclusion of only one or two may affect one's interpretation of the causal processes at work. Are they primarily economic or a function of literacy levels? Can religious beliefs be disentangled from familial influences? Can the contextual effects of predominantly female groupings be separated from those of male-dominated institutions? Where one is concerned with much more micro contextual settings such as friendship cliques, will not individual members have self-selected themselves into such settings on the basis of combinations of contextual variables? For instance, women's cliques may contain members of approximately the same age and education, having similar occupations and religious orientations, or perhaps children of approximately the same ages. If so, the contextual variables will be partly dependent and the inter-correlations among them partly spurious and due to individual-level variables.

Finally, when persons move about from one context to another, or whenever the levels of contextual vari-

ables change, there will be the added problem of specifying the temporal sequences and durations involved. We shall briefly discuss this problem later, but here need to note that theoretical arguments regarding contextual effects are often non-specific with respect to this temporal dimension. As a result, one must be sensitized to the possibility that the wrong contextual unit may be assigned to the individual simply because the appropriate influence period is not the current one. Given opportunities to self-select into contexts, we must also recognize that past behaviours Y_{ij} may affect later contextual preferences. For instance, the previous choices of a woman to have children or to work may affect her present immediate peer choices. In such instances, event-history approaches may be the most suitable device for uncovering mechanisms of this type, as well as supplying the information necessary for proper aggregating decisions. For instance, it may make more sense to aggregate together women who have first had a child and then worked, in contrast to those who have followed the reverse pattern, rather than to group them more simply by age or parity level.

Contextual effects of \bar{Y}

It may be reasonable to suppose that individuals' behaviours are influenced directly by the other behaviours they witness, quite apart from the characteristics we have been considering under the rubric of the \bar{X}_j . Indeed, as Przeworski (1974) and Erbring and Young (1979) note, it seems far more plausible in many instances to assume that contextual effects will operate in this fashion, especially when these behaviours are more easily observed or ascertainable by the relevant actors than are the \bar{X} levels.

Erbring and Young argue that \bar{X} -type representations of contextual effects based on either normative-interaction or comparison processes are misleading and rely on a 'social telepathy' or an action-at-a-distance assumption. A given student's performance, for example, can be influenced by his or her own abilities and by other students' performances, but how can their abilities affect that behaviour?

In formulating Y -type models we must allow for some lag period, but as long as average behaviour levels do not follow erratic patterns we may expect that actors will observe those that have occurred in the recent past, or perhaps trends in these levels, and base their own behavioural decisions upon them. For example, women may decide to have another child if their friends have done so in the recent past. Or perhaps they may base their behaviours on those of women in their mothers' cohorts.

If so, then we may take Y_{ij} as a function of \bar{Y}_j , as

well as other factors. Ignoring the temporal factor for the time being, we might use the simple equation

$$Y_{ij} = a + b_1 X_{ij} + b_2 \bar{X}_j + b_3 \bar{Y}_j + e_{ij} \quad (5)$$

where we have also allowed for a contextual effect owing to \bar{X}_j . We will be confronted with the added complication that \bar{Y}_j is very likely to be highly correlated with \bar{X}_j — even where Y_{ij} and X_{ij} are only modestly related — because of the inflating of correlations among aggregated variables.

If we are given only the aggregated data we will be obliged to use the macro equation

$$\bar{Y}_j = a + (b_1 + b_2) \bar{X}_j + b_3 \bar{Y}_j + \bar{e}_j$$

or
$$\bar{Y}_j = \frac{a}{1 - b_3} + \frac{b_1 + b_2}{1 - b_3} \bar{X}_j + \frac{\bar{e}_j}{1 - b_3} \quad (6)$$

Not only will the coefficients b_1 and b_2 be confounded, as before, but we must be concerned about the magnitude and sign of $(1 - b_3)$.

Ordinarily, we would expect b_3 to be positive but less than unity. That is, actors will be induced to conform to the behaviour patterns of others, but only partly so. If so, then $(1 - b_3)$ will be a positive quantity less than unity, and the estimate of the (confounded) quantity $(b_1 + b_2)$ will be inflated. Were we to ignore the effects of \bar{Y}_j we would thus tend to exaggerate the impact of X_{ij} , or \bar{X}_j , or both. On the face of it, the omission of average levels of dependent variables from contextual models appears to be a serious error, especially if we recognize that such inflated estimates will occur regardless of the X variable that has been selected. This problem does not seem to have been given the attention it deserves in view of the plausibility of \bar{Y} effects.

There may be circumstances, however, when b_3 is negative, implying that the individual's behaviour moves in the opposite direction from the group mean, as in the case of deviant behaviour. If so, the term $(1 - b_3)$ will be greater than unity and our estimate of $(b_1 + b_2)$ will be deflated if we ignore \bar{Y} effects. It may also be possible that b_3 is positive and greater than unity, in which case $(1 - b_3)$ will be negative, and our estimate of the sign of $(b_1 + b_2)$ will be incorrect.

Obviously, without a well-specified micro-theory that contains the appropriate contextual-effect terms, we can easily be misled in instances in which only the macro data are available. But such a specification will need to involve the temporal factor, since there will necessarily be some time lag between an actor's observation of the \bar{Y} level and his or her own behaviour.

Such time lags may also depend upon the reference group or contextual unit, as suggested by our example of a woman's peer influence versus that of her parental cohort. Perhaps she is influenced by her mother's cohort's behaviours a generation ago, and the very recent behaviour of her own peer group, and the contemporary attitudes of both sets. In order to avoid extreme multicollinearity problems in such a model it may be necessary to study community contexts in which relatively rapid changes have been occurring, so that the effects of peers and parental reference groups can be separated.

Erbring and Young (1979) construct a more general formulation of what they call endogenous feedback models involving others' behaviour by substituting for the very simple \bar{Y} term a contiguity matrix W that allows for various kinds and degrees of connectivity among the actors within each group. They also discuss the peculiar specification biases introduced when these endogenous feedback processes are ignored when attention is confined to individual-level variables.

We may only speculate that perhaps one reason why \bar{Y} effects or endogenous feedbacks have tended to be ignored in contextual models is that they pose difficult or even intractable problems for the analyst. But if this is the mechanism through which many contextual variables actually operate in the real world, ignoring them will not make them disappear and may only keep us conveniently ignorant of possible inflating or deflating effects of omitting such variables from our models.

Multiple contexts

In settings of any degree of complexity there will be numerous contextual units that not only impinge unequally on the actors concerned, but that also may have more or less clear boundaries, may be nested or partially overlapping, and may have differing degrees of relevance according to the dependent variable being studied. Many of the criticisms that have been levelled against highly simplistic contextual analyses involving a single contextual unit have, in effect, noted this rather obvious point. In principle, this complication does not require any basic departures from standard multivariate analysis procedures. One simply introduces further contextual terms, possibly representing different contextual units as well as distinct sets of variables for each of these units. Thus if one is dealing with school children, certain contextual variables may refer to their families, others to neighbourhoods or schools, and still others to classrooms or peers. But not only does this add a large number of variables, it also involves a host of complications relating to the

presumed homogeneity of actors. For it becomes much less reasonable to assume that contextual influences will operate in the same ways for persons who are embedded in these contexts in diverse ways. Thus the search for statistical interactions becomes absolutely essential.

Let us begin with the very simple situation of nested contexts that often characterize hierarchically arranged institutions such as school systems, complex organizations, or political systems. (See Blau 1980; Eulau 1969). We may confine ourselves to only two levels, since the principles generalize rather simply. Suppose we are concerned with the behaviour of the i th individual within the j th subgroup of the k th group. Considering only the additive case, we could represent the behaviour Y_{ijk} as follows:

$$Y_{ijk} = a + b_1 X_{ijk} + b_2 \bar{X}_{jk} + b_3 \bar{X}_k + e_{ijk} \quad (7)$$

Note that if we have data available at the subgroup but not the individual level, aggregating by subgroups would produce the result

$$\bar{Y}_{jk} = a + (b_1 + b_2) \bar{X}_{jk} + b_3 \bar{X}_k + \bar{e}_{jk} \quad (8)$$

which would once more confound the individual and subgroup effects, but which would enable the separate estimation of b_3 , representing the effects of the larger group k . The biases in these estimates would again depend on our grouping procedure, but if we were willing to assume grouping by an included independent variable and the correct specification of equation (7), our estimates of b_3 and the combined $(b_1 + b_2)$ would not be biased, though we would lose somewhat in terms of efficiency.

If we were only able to aggregate by the larger groupings k , we would have to use an equation of the form

$$\bar{Y}_k = a + (b_1 + b_2 + b_3) \bar{X}_k + \bar{e}_k \quad (9)$$

in which the coefficients of all three terms have been confounded. Thus we see that even if the individual data cannot be recovered, it is advantageous to be provided with subgroup information, so as to unconfound the larger units' effects from those of the other two. A similar point holds in instances where sub-subgroups are embedded in subgroups of larger groups.

What if some of the boundaries of these nested contexts are misspecified, or if there are measurement errors in any of the \bar{X} -type (or \bar{Y} -type) variables? And what if subgroup means are highly correlated with the larger group means, as will frequently be the case?

Obviously, these and other complications are likely, but in principle present no more complications than in other multivariate analyses, and it would be unfair to fault contextual analyses, *per se*, because of these very common types of difficulties. Yet these rather obvious possibilities do argue, convincingly, for the need for considerable exploratory work before the major data-collection efforts are made. Are the operationally most convenient contextual boundaries (eg classrooms or kinship groups) the operative ones for the actors concerned? Just how reasonable is it to use the same boundaries for all members of a given subgroup? And is the assumption of strictly nested contexts a better approximation in some settings than others?

Comparison processes involving nested contexts may also involve complications that require supplementary information if identification problems are to be avoided. Suppose we are dealing with a member of the j th subgroup, say a particular minority or perhaps a kinship group. Does that person compare himself or herself with the subgroup mean \bar{X}_{jk} , the mean of the larger group \bar{X}_k , both, or neither? Perhaps a comparison is also being made between the group and subgroup means, as for example where minority members are assessing their occupational chances by estimating inequality levels. Indeed, if one wanted to use all three quantities $(X_{ijk} - \bar{X}_k)$, $(X_{ijk} - \bar{X}_{jk})$, and $(\bar{X}_k - \bar{X}_{jk})$ as separate independent variables in a linear equation, identification problems would be encountered unless all three 'main effects' of the component variables were assumed non-existent (Blalock and Wilken 1979). Obviously it would be useful to have supplementary information from informants as to their perceptions of their own comparison processes. Perhaps some individuals compare themselves primarily with members of their own subgroups and ignore averages for the total group as a whole. Others, however, may be primarily concerned with the differences between the subgroup and group means, regardless of their own relative positions. Clearly, the more levels of nesting, the more complicated the comparison processes could conceivably become, and therefore the greater the need for simplifications based on supplementary evidence.

More commonly, contexts will be overlapping rather than nested, and boundaries of these overlapping contexts will be more or less clear-cut. Furthermore, even in nested situations there will often be cross-cutting contextual units, particularly at the levels of the smallest nested units. Thus children will select friends from outside their own classrooms, though perhaps less so from outside their schools. Women will interact with non-kin peers as well as non-kin members of their parental generation. Perhaps the most disturb-

ing complication is the realistic possibility that no two actors can be characterized by the same combination of contextual units. Kinship units will partly overlap occupational ones. Male and female-oriented contexts will obviously overlap kinship networks, and probably also occupational ones as well. And each individual will have a unique set of close friends and confidants, as well as a unique combination of positions and roles in networks of other types.

Several implications are obvious. First, if one is provided with only aggregated data for such situations, disentangling these intertwined contexts will be virtually impossible. Regardless of the aggregating criteria that may have been used, one can be almost certain that biases will have been introduced for substantial numbers of actors, though differentially so. Thus if individuals have been aggregated by geographic criteria, this may not produce as serious distortions for persons whose day-to-day activities are confined to a small area, as compared with those who move about more freely. If they have been aggregated by age, sex, or kinship criteria — or combinations of these — the homogeneity assumptions implied for such aggregates may be much more realistic in some settings than in others, or for some age or sex categories than others. It therefore becomes crucial to analyse the individual-level data for at least a sampling of settings *before* such aggregating decisions have been made. This point is highly consistent with the analysis strategy proposed by Hermalin and Mason (1980).

Secondly, if one suspects that networks of influence are at all complex, and that the aggregation of individuals by simple criteria will produce rather substantial biases, this will have important implications for the ways in which data are collected and analysed. In particular, network type analyses for at least some settings would probably need to be made, ideally at an early stage in the design process. Several points can be made in this connection. Most important, perhaps, will be the need for data reduction techniques that enable one to simplify highly complex interaction networks into more manageable models that make it possible to characterize the settings in parsimonious ways.

For instance, the block-modelling approach advocated by Harrison White and his associates (White *et al* 1976) enables one to simplify a rather messy network structure to much less complex 'images' that permit one to characterize a given network simply by a set of scores. A given actor might be a member of three reasonably distinct networks, each of which might be characterized by a certain combination of scores that could be entered for that actor. But it would also be possible to designate a separate set of scores for each member according to that actor's roles or

positions in each of these networks (Burt 1976: 1977). One could thus have both a set of network scores (which are constants across all individuals within each network) and also a unique set of scores for each individual within each network.

The allowance for multiple contexts or networks permits one to examine a host of complications involving inconsistencies, strains, incompatible expectations, role conflicts, and similar phenomena. Some such possibilities may be indirectly measured as difference terms, with attendant identification problems when both the component and difference terms are used as explanatory variables (Blalock 1982). For instance, a given actor may be influenced not only by the separate norms of two groups, but also the incompatibility between them. Actors may also sort themselves into contextual settings that reduce these incompatibilities by, for example, selecting friends whose religious values reinforce a set of behaviours that they prefer to enact for purely economic reasons.

Such sorting or differential selection of context combinations implies several things for one's design and analysis. It may increase multicollinearity by confounding the effects of what might otherwise be analytically distinct contextual variables. It also implies the advisability of collecting data on individuals who have left a given setting or who have changed their more micro-level contexts. It also suggests the need to collect additional data concerning actors' perceptions of the distinctness of boundaries and the permeability of groupings, as well as their awareness of incompatible demands, role strains, or actual conflict among organized groups. The general implication is that contextual analyses that admit of this much complexity need to involve a great deal more than the introduction of group mean variables into single equations.

One further complication can be noted here. Przeworski (1974) and Sprague (1976), following Boudon (1967), emphasize models in which actors may be influenced by social contacts not only with members of their own category but also with others in the area. Since members of a second group will be influenced by contacts among themselves and also the first group, if only the aggregated data are available the problem may then be defined as that of estimating the influence parameters, given only the aggregated behaviours for the contextual unit (say, a voting precinct) and the proportions of each group in this unit. Sprague points out that in such instances identification problems will be introduced and that these can only be resolved by highly specific quantitative assumptions about some of the unknown parameters. The implication is that a very good theory is needed to achieve estimation in

these situations. Again, the obvious implication is a need to collect and retain the individual-level data wherever possible.

The problem of self-selection

One cannot make theoretical sense of the question as to whether individual-effect variables should be introduced before contextual-effect variables unless one has specified the direction of causation between the two kinds of variables. Presumably, if the contextual-effect variables have been continuously operative throughout the actor's lifetime, as for instance the impacts of community norms, religious values, or a set of macro-level economic factors, one may be reasonably willing to assume that such factors may have influenced the X_{ij} scores, rather than the reverse. But suppose we are dealing with a much more immediate and micro-level context, such as the influence of one's closest friends or perhaps the impact of a voluntary organization that has attracted a select group of individuals into its membership. Here it is indeed possible that persons will select their contexts on the basis of their own preferences or predispositions, in which case the X_{ij} may be taken as a cause of the particular \bar{X}_j or \bar{Y}_j belonging in the relevant equation.

As a general rule, we anticipate that the more micro-level the contextual unit, and the greater the permeability of its membership, the greater the proportion of persons who will self-select themselves into such contexts, and therefore the more problematic the direction of causation between X_{ij} and \bar{X}_j . If so, we would need considerably more over-time information to infer what is taking place. Among other things, it would be useful to know more about the saliency or importance of the individual-level independent and dependent variables for such groups, and the extent to which actors sort themselves into or out of such contexts primarily because of the levels of these variables. In one setting most actors may select a context for totally irrelevant reasons and then later be influenced to behave in certain ways. In another, however, they may be well aware of the relevant norms or average behaviour levels before entry and may have sorted themselves into different contexts so as to maximize the fit between their own preferences or behaviours and those of other members. In either case, it would be important to have time-series data so as to sort out the temporal sequences, or else retrospective data of high quality so that these temporal sequences could be inferred. How aware of the \bar{X}_j or \bar{Y}_j levels was the actor before joining? Are some actors well aware of these levels whereas others are not? If the mean levels affect

individual levels, are the temporal intervals approximately of the same duration for all actors?

If one is unfortunate enough to have to work with data that have already been aggregated, then especially whenever there are several distinct levels of aggregation, it may be that aggregation by a dependent variable has taken place, and we may encounter the kinds of aggregation biases previously discussed. So as to avoid such a complication, one may decide to ignore the relatively more micro contextual effects in favour of the macro ones. This may, however, introduce specification errors because of the fact that the more immediate contexts may be the most important ones in many instances. Thus trade-offs may exist between the objective of specifying the most 'relevant' contexts and that of avoiding improper aggregating decisions. The implication is that if the more micro contexts are to be retained, one must pay the price of obtaining much more complete information about temporal sequences and self-selection mechanisms.

If one were willing to assume a very simple sort of self-selection process to the effect that individuals choose their contexts by matching their own X_{ij} levels as well as possible with the \bar{X}_j values, then we could take X_{ij} as a 'cause' of \bar{X}_j in the sense that the particular context in which the individual finds himself or herself is directly influenced by that person's X_{ij} level, and we would handle the problem as we would any other recursive set-up. But it seems much more likely that actors will self-select themselves into contexts on the basis of combinations of characteristics, or because of some other characteristic that may be highly important to them but perhaps irrelevant to the investigator. Suppose, for example, that actors select their contexts according to their W_{ij} levels, so that we may take the \bar{X}_j level for the selected context as a function of W_{ij} rather than X_{ij} , as illustrated in figure 12.4. Unless one is able to specify the causal mechanisms responsible for any correlation between X_{ij} and W_{ij} , one would not want to assume that X_{ij} even indirectly affects \bar{X}_j . And, of course, W_{ij} is likely to be either unmeasured altogether or very imperfectly measured, so that there will be considerable ambiguity as to how to account for the association between X_{ij} and \bar{X}_j .

If it were true that the group mean \bar{X}_j affects X_{ij} , which in turn affects Y_{ij} , it is likely that the context will also affect other individual attributes that impact on Y_{ij} . One possibility is that \bar{X}_j itself affects both X_{ij} and W_{ij} , but another is that there are two correlated contextual variables \bar{X}_j and \bar{W}_j that affect their individual-level counterparts, which then affect Y_{ij} . These two possibilities are diagrammed in figures 12.5 and 12.6, respectively. Needless to say, there are a multitude of alternative possibilities. In both of these figures we note

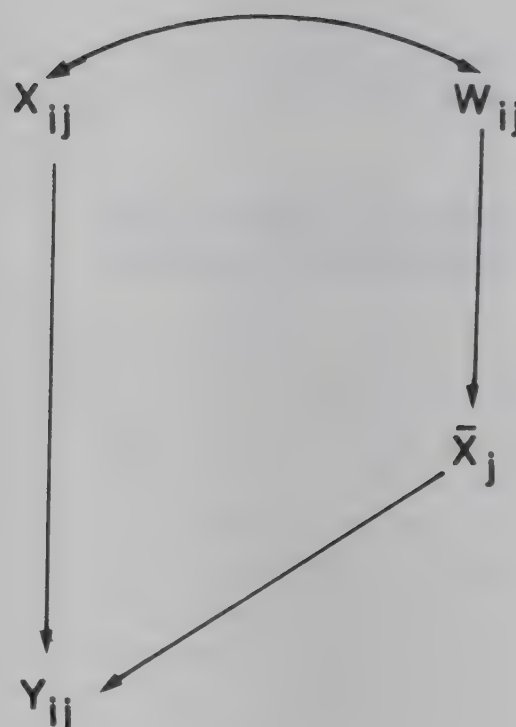


Figure 12.4

that if W_{ij} and \bar{W}_j were unknown and unmeasured, then \bar{X}_j would belong in the equation linking Y_{ij} and X_{ij} .

In concluding this section it is well to stress a point made by Farkas (1974) and by Boyd and Iversen (1979). If one does not have an adequate theory to account for the correlation between individual and contextual-level variables, the temptation may be to make an arbitrary decision to introduce one or the other level variable first, see how much variance can be explained, and then to allocate only the additional explained variance to the other variable(s). Such a procedure, however, leads to very different conclusions depending on which variable is introduced first. Without an agreement on the implicit or explicit theory

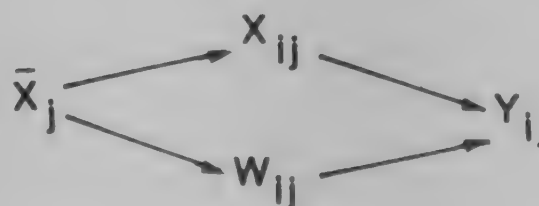


Figure 12.5

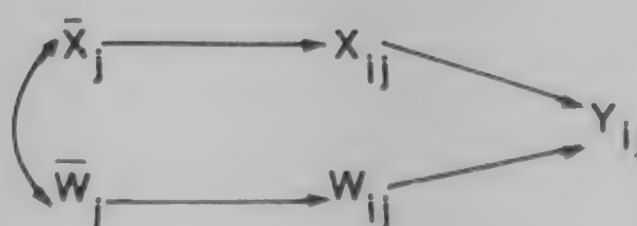


Figure 12.6

involved, we can make no headway in resolving any disputes that may arise concerning such a decision.

12.4 IMPLICATIONS FOR RESEARCH DESIGNS

Unfortunately, research designs often involve far too little anticipation of data analysis complications and sometimes are totally based on data collection costs and efficiencies. Yet, as we have seen, in cross-level research one must be prepared to encounter a host of complications that are often more severe than those that arise at a single level of analysis. It would seem to follow, then, that design considerations will prove to be far more crucial and complex in such cross-level analyses, where concerns about data collection costs may be no more important than those of multicollinearity and the confounding of variables at different levels of analysis.

Furthermore, it is all the more crucial that designs be based on careful exploratory research regarding such things as the appropriate number of levels of analysis, whether or not nested or overlapping contexts will be delineated, strategies for unconfounding highly intercorrelated contextual variables, the possibly differential impacts of measurement errors, and the diversity of actors who may be influenced in different ways by contextual variables at distinct levels. Indeed it is difficult to overestimate the crucial importance of such prior exploratory research.

Anticipating one's ultimate data analysis, it is clear that a number of crucial pieces of information must be provided. First, for each individual actor, or for each 'case' at the most micro level under consideration, one must have data appropriate to each context that is deemed relevant. If, say, one wishes to distinguish two levels, one being nested within the other, the appropriate units must be identified either with a code number or with a set of scores that can be inserted into the individual-level equation (Freedman 1974). If individuals are also thought to be influenced by additional contextual variables that are unique to those individuals (eg friendship cliques), these too need to be associated with these specific individuals. If problems of confidentiality arise, as for instance the possibility that individual respondents can be too easily identified because of their unique combination of contextual units, the names of these contexts may need to be replaced by scores, or exact scores by ranges of scores. If individuals have moved about from one context to another, and if some of the contextual variables are expected to operate at different times during the individual's life course, these changes in contexts also need

to be recorded. Obviously this requires not only additional data but also a series of assumptions as to the lag periods involved.

Secondly, if contextual effects are to be isolated, the contexts must differ or vary by more than a trivial amount. In terms of context means, this implies that the \bar{X}_j must differ considerably among themselves, and similarly for subgroup means \bar{X}_{jk} if these are to be distinguished from their respective \bar{X}_k . Obviously, then, some enlightened guesses must be made concerning these means before actual data collection, and this will require a clear specification of the contextual variables that will be used. It is not sufficient, say, to select a sample of urban and rural communities, merely hoping that they will differ from each other in a number of distinct ways. Perhaps they will, but without prior research it may also be found that context means on, say, X_1 will be highly correlated with context means on X_2 . Or perhaps the contextual units will vary with respect to their overall means, whereas subgroup means may be virtually identical to group means in, say, all of the rural communities.

Concurrently, one should anticipate complications that may be introduced if the selected contextual units are too homogeneous, thereby making it very difficult to separate out the effects of contextual variables from those of the individual counterparts. For instance, in a homogeneous contextual unit, the mean \bar{X}_j will tend to be highly correlated with the individual X_{ij} scores. One could, perhaps, deliberately over-sample deviant individuals within such contextual units and thereby increase the subsample variances and thus reduce collinearity. But such a design might artificially introduce additional complications of a sort similar to those that will be discussed below. In what additional ways will these over-sampled deviant members differ from the others?

As a general rule, the larger the number of distinct contextual variables we wish to examine, the more macro-level units we will need to use. A multi-level design, say characterized by three or four levels of nested contexts, may not only have to be carefully conceived, but one should anticipate that it will be more difficult to distinguish among several rival hypotheses at the macro level — because of the smaller number of units — than will be the case at the meso or micro contextual levels. For instance, if one has 15 school districts, 60 schools, and 240 classrooms, multivariate analyses at the classroom level can be more complex than at the district level. Given limited funding, decisions as to 'optimal' numbers of each type of unit will have to be made. Ideally, these decisions should be based on preliminary studies that have made it possible to weed out a large number of explanatory

factors at each level. Most certainly, a design should not be fixed arbitrarily on the basis of cost or political considerations, with the design parameters severely restricting the numbers and kinds of variables that can be used at each level. Presumably, one does not design a study without having a set of priorities clearly in mind.

It also goes without saying that one should avoid premature aggregation. This applies to the premature aggregation of nested contexts into a single larger one, as well as the more obvious operation of throwing away individual-level data. Thus if there are small friendship cliques operating within somewhat larger groups or secondary organizations, it is important to collect one's data in such a way that clique memberships are retained. If these clique-level contexts turn out to be unimportant, they can always be aggregated out at a later stage, thereby simplifying the subsequent analysis. But if these smaller contexts are not noted at the data-collection stage, some relatively strong assumptions may have to be made about their negligible impacts, as their effects will be confounded with those at the next higher level units. A similar though more complex difficulty will arise in instances where contexts are overlapping, but where some of these contexts have been ignored.

Although results of several studies that have involved somewhat different kinds of contexts may sometimes be spliced together to provide estimates of distinct contextual effects — a strategy that has been suggested by Boyd and Iversen (1979) — such a splicing will inevitably require one to substitute some relatively strong assumptions that will not be verifiable under most such circumstances. This, in turn, suggests the very important point that a co-ordinated and carefully planned effort to build each study upon those that have preceded it, with at least some such studies involving data that have been simultaneously collected for multiple contexts, will be a far more fruitful scientific enterprise than would be possible with a series of disconnected, *ad hoc* studies, each of which is conducted on a smaller scale and which includes only very limited contextual information.

We have noted that problems of multicollinearity are apt to be especially serious in multi-level analyses, and so a rather obvious design strategy is to attempt to select one's cases so as to reduce the inter-correlations among at least some of one's principal independent variables. This may be accomplished, for example, by over-sampling cases for which two or more independent variables are related in the direction opposite to that for the majority of others. What may be unrecognized, however, is that such a strategy may alter the relationships between ignored variables and both

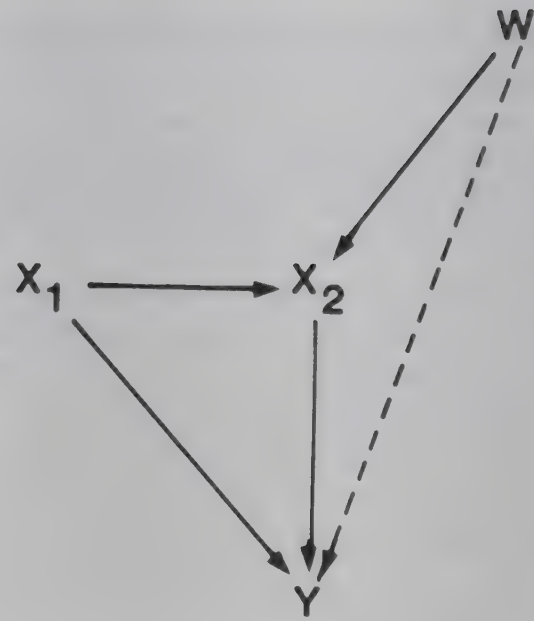


Figure 12.7

independent and dependent variables of interest. Without a carefully stated theory as to what is taking place, one may in effect exchange one set of complications for another.

Consider the very simple model of figure 12.7, in which the two independent variables X_1 and X_2 are highly correlated in the population owing to a direct causal connection between them. Suppose, also, that W is an unmeasured cause of X_2 and is only weakly related to X_1 . (To take an extreme case, the correlation between X_1 and X_2 might be 0.8 and that between W and X_2 equal to 0.6. If W and X_1 were completely uncorrelated this would of course imply that all of the variance in X_2 is accounted for by these two variables.) Let us leave open, for the moment, the question of whether or not W belongs in the equation for Y , indicating this possibility by means of a dashed line between W and Y .

Now suppose we select cases in such a way that X_1 and X_2 are virtually uncorrelated within our sample, thereby resolving our collinearity problem between these two variables. How could this be accomplished? Assuming all relationships to be positive, this would require us to search for unusual cases for which high scores on X_1 are associated with low ones for X_2 , so as to compensate for the more typical ones for which these two variables move in the same direction. But cases that are low on X_2 but high on X_1 will tend to be those that are also low on W , whereas those that are high on X_2 but low on X_1 will be high on W . Thus we will be over-sampling in such a way as to confound the effects of W with those of X_1 , since that relationship will become negative in our sample.

As long as W (or a variable with which it is closely connected causally) does not belong in the equation for Y , we will not be led astray. But since W represents, in most instances, a symbol for an unknown cause of X_2 ,

it may be difficult to justify such an assumption without a reasonably good theory. In the original model in which W and X_1 are assumed uncorrelated, if W belongs in the equation for Y but has been omitted in the misspecified equation, its effects will be confounded with those of X_2 , but not those of X_1 . But if we have selected our cases so as to remove the correlation between X_1 and X_2 , the relationships of these two variables with W will have been altered, and W may now be confounded with the effects of both.

For instance X_1 may represent a variable pertaining to a community's economic base, say the percentage of the labour force engaged in subsistence farming. Perhaps X_2 represents the illiteracy level of women and W the religious traditionalism in the community, with Y being a fertility rate measure. To make subsistence farming and illiteracy levels only weakly correlated, we may then over-sample communities with low (high) percentages in subsistence farming but high (low) illiteracy levels, without recognizing that religious traditionalism levels may thereby become related to subsistence farming. If traditionalism belongs in the equation for fertility but yet remains unmeasured we will unwittingly encounter the difficulty being discussed.

It is also possible that we will have increased the variance in W , though this will not necessarily be the case. It can be shown (Namboodiri *et al* 1975) that in a model like that of figure 12.7, if W belongs in the equation for Y , then bias (ignoring W) introduced in estimating the direct effects of X_2 on Y will be a function of the variance in W relative to that in X_2 . If we were lucky enough to have a very small variance in W then, even though W were not included in the misspecified theory, its biasing effects might be negligible, but if, in our attempts to manipulate the X_1 and X_2 correlation, we were to find it necessary to over-select on extreme cases on W we could very well amplify the unknown biases produced by W .

All of this merely exemplifies the very important point that design decisions need to be thought through very carefully in advance, not only from the standpoint of cost and convenience considerations, but also from that of possible complications produced by omitted variables. Clearly, this requires at least rudimentary theories about what such variables are and how they may be operating. One must be especially wary of advice given by statistical specialists who do not inquire as to exactly what the investigator is willing to assume about variables that may be inadvertently manipulated in carrying out the proposed design. As we have noted, there can be complications even when the design features appear to involve only the independent variables, and we may be virtually assured that if

designs involve manipulations of dependent variable variances or covariances, distortions will result. Even though it may be difficult to specify the precise nature of such distortions in the absence of a good theory, it is well to keep such potential difficulties in mind. Unfortunately, we often fail to do so whenever we plan our studies first and then think about analysis complications.

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13 Cross-Level Analyses: Discussion

D. Holt

I should like to make various comments which are not necessarily tied to specific points in each of the papers.¹ Professor Blalock, in his presentation, apologized for the length and complexity of his paper. I feel that there was no need for him to do this and that his paper surely deserves very careful study.

I should like to begin by pointing out that all of the models we build are approximate and this will be especially true in the circumstances which have been described to us during this Seminar. There are very clear data measurement problems and classification problems which are not trivial and which will lead to any statistical model used being less precise than we might hope. In addition, the concept of a community is not entirely clear and there are bound to be problems in the definition of community boundaries. In practice, these are likely to be different for different variables in the same analysis, for different analyses from the same set of survey data, and for different subsets of the population. It may be, for example, that the definition of a community and the effects of a community-level variable are quite different for a child, a young adult or an elderly person. This will create complexities in the analysis and will have implications for survey design since one cannot use the community as part of the design structure if the definition of a community is changing all the time. There is, in addition, the idea that there is no one community but several which may or may not be in a hierarchical structure. The number of levels of a community and whether or not these were nested would add considerably to the complexity of any statistical model fitted.

In addition, the studies we have had described to us use many simplified proxy variables. Such items as whether or not there is a tarmac road or a clinic are being used as a rather simple indication of much more complex phenomena. In addition, there are a number of community-level measurements being made when

really we are primarily concerned with individual variables. Collection of such data on the community level may or may not be without error although it is presumably much easier to collect. For example, if the question is whether or not there exists a clinic, then this can be presumably measured without error. However, different individuals in the community may have a different perception about whether or not the clinic is available for them to use; whether it has the service or drugs which they may need; and whether there are any social or religious impediments to the clinic being used by that individual. Another comment about what we might expect from the use of community-level variables is that these cannot explain within-community variation and therefore we must expect only modest success in terms of explained variance if they are used as explanatory variables.

A further comment about the studies which have been described is that they tend to use 'instant' data when the situation is much more complex (dynamic). If a dispensary is built in a village then it would be reasonable to ask what the initial impact was, how this changed over time, whether it was the same for new migrants as for the existing population and so on. To try to encapsulate that information in a simple cross-sectional survey asking about the existence of dispensaries is bound to lead to an over-simplification.

It is for these reasons that I say that all models are approximations and that this is particularly true in the context of types of data which are required in the studies which have been described. If the models are too crude then we lay ourselves open to the charges of being too simplistic or naïve such as those made by Professor Caldwell in his remarks during the Seminar. This leads me to comment on a suggestion made by Dr Verma that repeated surveys should be used with a number of simple items of information being collected. Whilst one can see the benefit of this approach, I would expect that such surveys will not provide the basis for the rather sophisticated causal models which are being built to explain fertility and mortality etc.

¹Ed's note. The paper *Some Issues of Sample Design in Community-Level Surveys* by V. Verma is not included in this volume.

It is fair to ask whether or not communities are part of the explanatory model which is being sought. If there are causal mechanisms operating, do these involve the community structure or does the community structure conceal these? I illustrate this point through some extreme examples. A community may to some extent be self-selecting and this may lead directly or indirectly to the relationship between the dependent and independent variable being distorted. For example, if the community expels the sick, the dying or the unmarried pregnant woman then any attempt to estimate fertility or mortality without taking this into account will lead to a misspecified model. The constitution of the community distorts the relationship between the dependent variable and auxiliary variables. Another example is where the community-level independent variables may be influenced by external agencies. For example, if it were the case that a clinic or dispensary was provided because of high mortality then the presence of a clinic in a community would be associated with high mortality and any model which would explain mortality with the clinic as an independent variable would be distorted. The examples chosen here are very simple and extreme to illustrate the point and are not meant to be realistic. However, much more subtle forms of selection may take place. The two examples given illustrate cases where the population structure itself or the population variables have been distorted but similar effects can be observed as a result of the sample selection process or because of aggregation in the estimation. Another well-known example of the same selection bias is the perennial problem of non-response.

Three types of variable have been defined: individual-level variables; community-level variables; and individual-level variables averaged to give community-level averages. In this last case, there has been some discussion of whether or not the community-level average exists separately from the individual. A case in point was given for Kenya where people of a particular educational standard moved from one region to another and the advantages which their education brought and the way in which it was perceived changed. In cases like this it may be the *perceived* level of educational attainment in the community which is the dominant variable rather than the *actual* level. One individual joining the community or leaving it may not change this perception and there will be lags in the effects that such migration might have. It is clear that these are very complex factors which would require extensive study of a longitudinal kind to unravel.

Taking into account all of these factors there is nevertheless the need to build models involving

individual-level variables, community variables and contextual effects. It must be recognized that including community-level variables and contextual effects changes the deterministic part of the model. Nevertheless, the variance structure of the error term will be complicated and will involve both cluster-level variation and individual variation. Whatever model is chosen there will be residual intra-cluster correlation and this will effect the variance of the estimated parameters. Thus, standard procedures for statistical tests, confidence intervals and model selection will be affected. The preliminary numerical results for F tests given at an earlier session should be treated with extreme caution.

If the fitted model appears to need contextual effects then this may be because these exist in the population. Alternatively, it may be that these are exhibited not because there is a contextual effect in the population but because of model misspecification at the independent variable level or at the community variable level. It may also be that contextual effects are produced by the grouping/selection effects described earlier. There is a clear need for diagnostic procedures to try to disentangle some of these possibilities. When contextual effect models are fitted it is important to examine the residuals and intra-cluster correlation so as to ensure that the model fits the data well. There is a sense in which, having fitted a model which includes contextual effects, there is a need to explore all the possible alternatives to the existence of a contextual effect in the population. Another point concerning contextual models is that the sample average \bar{x} is often used to estimate the community average. This will lead to an error in the independent variable and will create a classic error-in-variables problem and will bias estimates. The same sort of thing will occur when independent variables are poorly measured or where variables measured at the community level are used as a proxy for individual-level variables. In connection with using \bar{x} this problem will be particularly acute when the sample size within the community is small. It will also be acute when the sampling unit is smaller than the community. For example, if the community-level variable is required at the village level and the sampling unit is a subdivision of the village there will be an additional contribution to variance coming from the selection of a subdivision within the village.

All of these factors lead to a number of considerations for survey design:

- 1 There will be a conflict between national designs for descriptive purposes and the type of data collection needed to explore causal mechanisms. There will

also be design conflicts if different definitions of a community are used for different variables or for different subgroups in the community.

- 2 If contextual models are going to be explored then a case can be made to increase the sample size within selected clusters. The corollary of this decision will be that community-level variables will explain less of the variation since there will be residual within-cluster variation which cannot be explained by community-level variation. Such a design will also make the error structure worse and will have a greater effect on the distortion of variances and tests due to design effects.

- 3 A number of speakers have referred to the collinearity of community-level variables. A way to break the collinearity would be by selecting clusters with the right mix of community-level variables. Within a probability design this could be done by stratification of the community on the basis of community-level variables where these were known and by using heavily disproportionate allocation to strata. The consequence of this would be that probabilities could not be used in the analysis of the data to produce probability weighted estimates. This is because the probability weights would substantially reduce the influence of those clusters which had been chosen to break the collinearity between community-level variables. In a very real sense the design and the probability weighted estimation would be in direct conflict.

However, to ignore the probabilities of selection could lead to biases if the model being fitted is misspecified. It would be important to use diagnostic procedures to try to detect such model misspecification which might be associated with the selection probabilities.

- 4 The other form of collinearity is that between individual-level variables and the group average. This is particularly true when the group (com-

munity) is relatively homogeneous on the independent variable. One possibility suggested by Blalock would be to select individuals who were different from the community average on the independent variable but there would be problems in doing this caused by the possibility of selection bias and also difficulties about estimating the community-level average. In addition, if this average were not known in advance it is difficult to say how such selection would take place.

- 5 Another approach to both of the collinearity problems would be to use a longitudinal survey through time to help to disentangle the variables. Such a study would need to be carefully designed if it were to yield the required information. Even in developing countries with a long history of survey work such studies have proved difficult because of the loss of respondents over time and the much more severe methodological problems which such studies entail. It may be that in a developing country such a study would prove too difficult to carry out. An alternative would be to take advantage of changes which occur in the population from time to time. For example, if a decision is made to introduce family planning programmes to parts of a country then a rapidly organized before/after study could be mounted to explore the effects. Such a reactive approach to changes has implications for the funding of research and for the speed for which one would need to respond to policy changes.

When one considers all of the problems which are inherent in exploring the factors which influence topics such as fertility or mortality it really is not so surprising that the results that have been presented during this Seminar are a little disappointing. It might be better to record them as the first step along the way to exploring the importance of community-level and contextual effects.

Part IV

Collecting Community Data

14 Intensive Community Studies

Mead Cain

14.1 INTRODUCTION

My task is to discuss the relative merits of intensive community studies as an approach to incorporating 'community variables and institutional factors' in research on the determinants of fertility. The organizers of the Seminar suggested the following structure for my paper: (1) state the research issues that have motivated my work over the past eight years; (2) discuss why I have chosen to approach these issues through intensive community studies; (3) describe how I mix local survey data collection (structured questionnaires, etc) with other types of data collection; (4) consider the extent to which information similar to that which I collect in a few locales could be collected on a wider scale; (5) further to point (4), discuss the feasibility of addressing the questions that motivate my research with less detailed data gathered from a large number of widely scattered communities. I will attempt to cover this ground in what follows.

14.2 AN EXAMPLE OF MULTI-LEVEL FERTILITY ANALYSIS

I begin with what in any other context would amount to a trivial piece of history, but which here provides some insight into my motives for pursuing village-level research in Bangladesh. One minor novelty of my doctoral dissertation at Johns Hopkins (Cain 1975) was the incorporation of community-level variables in an analysis of contraceptive use in Pakistan. (A quick glance at the bibliographies of the papers for this Seminar confirmed that this is a little-known fact.) It was my frustration with this endeavour that led me toward the mode of research that I subsequently adopted. Hopkins was the repository of the Pakistan National Family Planning Impact Survey – an extended KAP survey conducted in 1968–9. As is often the case, my choice of dissertation topic was heavily

influenced by the availability of data. At the time that I was choosing a topic for my dissertation, the notion of incorporating community-level variables in fertility surveys and research was becoming topical (Freedman 1974; Hauser 1973). In addition, the idea of multi-level analysis was congenial to me because of a growing disaffection with that I perceived to be the individualistic orientation of most fertility theory, research and policy.

The Impact Survey employed a two-stage sample design, with secondary sampling units averaging 300 contiguous households. These were either villages, parts of large villages, or groups of small villages. The enumeration teams collected information on the following characteristics of each village: accommodation, education and medical facilities; transportation, communications and accessibility; local industries, electricity and other amenities. Information on a total of 208 villages was collected (analysis was conducted on a total rural sample of 1604 currently married women below age 50).

The conceptual framework for analysis had at its core a version of the micro-economic theory of fertility (Leibenstein 1975). Leibenstein's formulation was attractive because it gave greater play than the Chicago variant to the economic utility of children. Three dimensions of village modernization or development in rural Pakistan were identified (commercialization of agriculture, communications and transportation development, and social overhead development), and these were operationalized as indexes composed of items from the community-level variables. The sample of women was divided into five socio-economic strata according to husband's occupation and land ownership. The five strata encompassed persons of high status (landlords, professional classes, civil servants), skilled non-agricultural workers, owner-cultivators, tenant cultivators, and unskilled landless labourers. In view of the fact that the impetus towards modernization was so recent and the apparent rigidity of the system of social stratification in

rural Pakistan, I conjectured that village modernization would represent a different experience for each socio-economic stratum, resulting, through class-specific effects on the value of children, in an increased demand for contraception for some, and no change or a decrease in demand for others. The statistical model resembled an analysis of covariance, with socio-economic status as the covariate.

I managed to conclude that 'In general, the empirical results are consistent with the hypotheses' (but only with the accompanying baggage of caveats and cautions concerning probable measurement error, dubious construct validity, marginal statistical significance, and the sheer speculation involved in interpreting parameter estimates). I had very little conviction in the results. The idea still seemed promising but the data and, very probably, the setting were wholly inadequate for exercising it.

One can start with the dependent variable. Current use of contraceptives at the time of the Impact Survey stood at 2.6 per cent for programme methods and 3.9 per cent for all methods. In order to approach a workable level of prevalence, I had to employ ever-use of contraceptives rather than current use. Rural Pakistan then, much as now, was essentially a non-contracepting, 'natural fertility' population. Without meaningful variance on the dependent variable, modes of explanation that depend on analysis of variance (as is the case in survey research) are doomed.

Next, consider the operationalization of the three dimensions of village modernization. By 'commercialization of agriculture', for example, I had envisaged fundamental change in traditional social and economic relationships: transformation of tenurial arrangements; erosion of traditional patron-client relationships; increased scale and capitalization in agricultural production; the development of markets and emergence of wage labour. To put into operation this construct I had available the following items, all of the 'bricks and mortar' variety: whether or not the village had electricity, a rice mill, a flour mill, a textile mill. An extraordinary leap of faith is required to believe that close correspondence exists between the resulting index and the underlying conceptualization. As great a problem as this tenuous correspondence, moreover, was the very conceptualization of the commercialization process. The literature on rural development experience in Pakistan was extremely limited. Material pertinent to the structure and variety of traditional social and economic arrangements in rural areas, and the way in which these were changing, was particularly scarce. Having never set foot in Pakistan, I had no first-hand knowledge of the actual impact of various development policies and programmes, or, for

that matter, the social or economic significance of a flour mill in a village. Therefore, not only was I wary of my indicators, I was unsure of what I should be trying to measure.

An important argument of the thesis was that village modernization would interact with socio-economic status in affecting demand for contraception. It was thus crucial to identify respondents according to membership by socio-economic stratum. Further cracks in the empirical edifice become apparent here. The Impact Survey provided unusual detail on husband's occupation, enumerating 74 separate categories of occupation. Unfortunately, however, all cultivators (a group that comprised the majority of respondents) were lumped into a single category, without distinguishing tenurial status or size of holding. Size of holding and tenure are, of course, the stuff of stratification in such societies. To further subdivide this category of respondents I resorted to additional data on whether or not the household owned land (although it was not clear whether responses pertained only to arable land or to both arable and non-arable land) and whether or not the husband reported being self-employed; however, I was not confident about the results and, given the importance of the variable, the method of determining socio-economic status was far from satisfactory.

As I mentioned, the heart of the conceptual framework was an economic model of fertility. Village modernization was seen as affecting fertility behaviour through its impact on the economic value of children. Developing hypotheses concerning the effect of a particular dimension of village modernization on one of the socio-economic strata entailed specifying how and why the utility and utility costs of children (Leibenstein's terminology) would be affected. While in the case of rural development and social stratification I had at least some empirical material to draw on, here I had to rely almost entirely on speculation and assumptions void of empirical content. The Impact Survey contained no direct evidence on the matter, and I could find nothing in the literature on rural Pakistan. The only study I referred to in developing the hypotheses (and I did so repeatedly) was Mamdani's (1972) of several villages in the Indian Punjab. This work, a polemical and bitter attack on Wyon and Gordon's Khanna Study, is notably thin on hard evidence and has been roundly criticized for its superficiality and apparent bias.

At every major juncture, therefore, the enterprise was undermined: a weak dependent variable, inadequate evidence for proper conceptualization and specification of causal processes, and poor measures of important explanatory and control variables. A pass-

age from the concluding chapter suggests what I came to feel was a more promising approach:

'There is, perhaps, a more important question concerning villages as units of analysis or units of data collection for this research. In elaborating the ... relationship between the components of village modernization and demand for fertility limitation ... , it was apparent that the role of these components in altering social relations was at issue, in addition to the relevance of the physical attributes which our indicators of village modernization represented. Social relations are often not easily located in space This consideration suggests more detailed observations of the relevant social relations themselves (... for example, land tenure, employment patterns, relations between kin and castes ... , patterns of mutual dependence, etc), in addition to the global properties of villages. This would be a difficult task, probably impossible, with a research instrument such as the Impact Survey. In the absence of such observations, however, [one] is forced to make rather large and indirect jumps in inference. Given constraints on sample size, this suggestion implies a research design that carefully selects a limited number of villages on the basis of the criteria of interest ... , and allows for the detailed observation of a relatively large proportion of village members. This kind of research design would preclude some of the analysis which the Impact Survey permitted ... ; however, these limitations are likely to be more than compensated by better measurement and understanding of the relations between important variables' (p 192).

Implicit in this passage is a concession that available theory on the social and economic determinants of fertility was not adequate to sustain the hypothetico-deductive pretence adopted in the thesis. There was neither a sound basis for specifying causal models nor the necessary means to interpret associations between variables. The research issue that motivated the dissertation continued to motivate my subsequent work in Bangladesh and India. Indeed, I retained the major premise of the earlier work — that economic incentives and disincentives were major factors influencing fertility behaviour in developing countries. However, I adopted a more inductive epistemological approach, and decided to give high priority to the measurement of economic incentives and disincentives (the benefits and costs of children) and to the institutional and environmental setting that produced them.

14.3 COLLECTING COMMUNITY-LEVEL DATA: THE BANGLADESH FERTILITY SURVEY

Despite these conclusions, I still felt that one could greatly improve on the design of community-level questionnaires and that further attempts to collect village-level data in the course of fertility surveys would be worthwhile. The opportunity to participate in the design of a community questionnaire arose shortly after I completed my thesis. I arrived in Bangladesh in October 1975 to take up an assignment at the Bangladesh Institute of Development Studies. Although the main questionnaires for the Bangladesh Fertility Survey had been finalized by that time, the community questionnaire had not yet been developed. I expressed my interest in this activity and, working with the BFS staff, spent time during my first two months in the country helping with the design and field testing of the community-level module. My position was one of enthusiastic advocate among sceptics: I wanted a big, ambitious questionnaire that would address some of the many measurement problems that I encountered in my dissertation work.

After the initial work on the community questionnaire design, I lost touch with the survey as I became increasingly involved in my own fieldwork. In fact, I never saw the completed questionnaires. However, the experience of pre-testing was highly educational and sobering, and through that process, and my subsequent protracted fieldwork in a single village, I gained a better appreciation of the reasonable limits to such a research instrument.

The field trips for pre-testing the questionnaire were my first exposure to rural Bangladesh and several things soon became clear. First, it was very difficult to determine the boundaries of villages. The settlement pattern is dispersed rather than nucleated; local perceptions of village boundaries do not conform to official perceptions (indeed, there is inconsistency among official perceptions: for example, 'revenue villages' are often not coterminous with 'census villages'); and there can be great inconsistency in local perceptions of what constitutes a particular village. Secondly, there is no formal, or predictable informal, village government in rural Bangladesh, and thus it was difficult to know to whom one should direct questions. Inasmuch as all questions in the community questionnaire were framed in reference to the village and its population, the elusiveness of villages was, of course, a major problem. The dispersed settlement

pattern created additional reference problems in trying to determine the distance of various facilities and services from a village. (The village that I later worked in was spread out over two square miles. Villagers often used different facilities (eg markets, means of transport, schools, and mosques) depending on where they lived.)

The third realization was how difficult it is to elicit responses (in which one has any confidence) on anything but the most (literally) 'concrete' attributes of villages. Questions regarding an informant's perceptions of distributions in the village population, for example, or perceptions of local social dynamics proved difficult or impossible to frame in ways that were meaningful to the respondent. For the most part attempts to structure questions on such perceptions were abandoned. However, unlike the pre-test, where we came into a village 'cold', in the actual survey supervisors were instructed to complete the community questionnaire toward the end of their stay in a village, when most of the individual questionnaires had been completed. It was hoped that with greater exposure to the village they would be better able to identify good informants and broach more difficult questions. Therefore, the final section of the community questionnaire posed several open-ended questions on social dynamics intended to guide informal inquiry by the supervisor.

In the BFS community questionnaire, most items pertained to the availability and accessibility of services and facilities, relatively straightforward information of the 'bricks and mortar' class referred to above: paved roads, various forms of transportation, communications media, water supply, electricity, shops, mosques, banks, industries, co-operatives, mechanized irrigation, schools, health and family planning services and facilities. Even among these relatively straightforward items, what is notable about many, in retrospect, is the ignorance of conditions in rural Bangladesh that they betray. For example, one question asks whether a cotton mill is located in or near the village, whereas, in fact, almost no cotton was cultivated in 1975. The little cotton cultivation that took place was concentrated in the Chittagong Hill Tracts, an area from which only one intermediate sampling unit (of a total of 160) was selected for the BFS. Elsewhere in the questionnaire it is asked whether rice is grown in the village. In fact, it is inconceivable that rice is not grown in virtually every village in Bangladesh. Another part of the questionnaire sought to determine the presence or absence of certain specialized trades. Included among those mentioned were grocer, boatman, and fisherman. What I had in mind

by 'grocer', I suppose, was a local fruit and vegetable stand. In fact, almost all produce is purchased and sold at bi-weekly markets, of which there is a dense network in rural Bangladesh. While much of the exchange is accomplished through full-time intermediaries who specialize in particular commodities, it would be rare to find a village in which a sizable proportion of the population did not occasionally engage in trading — a very common form of off-season employment throughout rural Bangladesh. Just as (against this background information) one would not expect any interpretable variance in response to the grocer question, neither would one for responses concerning boatman or fisherman. Because most of Bangladesh is under water during the summer flood, many people own or have access to skiffs. When the flood waters recede, fish become trapped, or can easily be trapped, and these same people (or an equally large number) catch fish. The appropriate image, therefore, is not one of specialization (with some exceptions) but rather of mass seasonal participation.

As lessons in questionnaire design, the cotton mill and rice examples illustrate the problem of non-discriminating items. Erroneous preconceptions of rural society here lead to invariant responses. The questions on 'specialized trades' would produce variable but uninterpretable responses because the underlying assumptions about rural economic organization are not valid. Looming beyond these immediate lessons, however, are questions concerning the rationale for collecting such data and implicit models of social change and economic development.

To me, the major justification for the community questionnaire was the expectation that the level of development or modernization of villages would vary in a meaningful way. My perception of what constituted meaningful variation in village development was primarily informed by the ideas developed in my thesis (see, for example, the reference to 'commercialization of agriculture' above), which in turn were heavily influenced by textbook discussions of modernization and social change. The specific questionnaire items were not, in my view, significant in and of themselves, but rather as indicators of underlying dimensions, such as degree of structural differentiation and integration. (The process of structural differentiation entails increasing role specialization, and structural integration describes the emergence of institutions that serve to integrate newly differentiated roles. See Smelser 1963.) Thus, for example, I expected to find villages ranging from the highly commercial, with competitive wage labour markets, to traditional, characterized by subsistence production and undevel-

oped markets. These expectations are evident in many of the community questionnaire items. Indeed, the purpose of the grocer/boatman/fisherman line of questioning was to determine degree of role specialization and differentiation.

I subsequently learned that these expectations were completely out of line with reality in Bangladesh. No such variation as I expected exists. The fault, incidentally, lies not so much with 'textbook notions of social change', as with the attempt to apply concepts developed for whole societies over a period of time to villages at a single moment in time. Active, competitive wage labour and product markets exist throughout rural Bangladesh, and there is nothing new about them; evidence suggests that land tenure arrangements are remarkably invariant in rural areas; rural Bangladesh has long been characterized by a high degree of labour mobility; electricity and modern irrigation may bring the promise of increased incomes and, perhaps, shifts in cropping patterns, but they do not (yet) signal fundamental transformation in social or economic structure; the sheer density of the country precludes the possibility of true isolation, and postal service is quite efficient in rural areas. While exhibiting some local variation, Bangladesh is, nevertheless, remarkably homogenous in climate, topography, and agriculture.

Contrary to my earlier expectations, I came away with an impression of deep-rooted sameness in rural social and economic structure. Certainly, public development policy cannot claim to have altered this basic structure over the last two decades, or produced significant regional disparities in rural development. Now, when I look over the community questionnaire, I am struck by how incidental most of the attributes are to the structure of village life and, in the case of government programmes involving extension or organizational effects (co-operatives, for example), am inclined to regard them as little more than labels.

The concept of community development (or village modernization) is problematic largely because so much of the means of development is not specific to communities. Factor and product markets, transportation and communications systems, and infrastructure, for example, are all essentially exterior to villages and exist at other levels of aggregation. Bangladesh may be unusual in the degree of sameness that its villages exhibit, and, perhaps, greater true variation in level of 'village development' can reasonably be expected in other settings. However, the awkwardness of the community, or village, as a unit of analysis remains a more general problem, as does the temptation to attribute too much structural significance to community variables of the kind discussed here.

14.4 THE BANGLADESH VILLAGE STUDY

My research in Bangladesh focused on a single village in Mymensingh District. The purpose of the research was to study the determinants of fertility, with an emphasis on marital fertility and economic determinants. For a statement of the objectives of the research I quote from the preliminary proposal:

'The initial assumption is that fertility outcomes are a consequence of couples' perceptions and evaluations of the relative costs and benefits attaching to children. The concept of cost and benefits is not purely economic. For example, children may be perceived by parents to have positive value for such reasons as expression of identity, perpetuation of lineage, etc. Similarly, children can be costly in a psychological sense. Nevertheless, given the objective reality of rural village life, that is, extreme poverty and uncertainty, our second initial assumption is that the economic costs and benefits of children are the most important factors in determining the deliberate control of fertility or the absence of such control. This assumption underlies the proposed focus on the measurement and understanding of the costs and benefits of children in rural Bangladesh; however, we shall also be interested in testing this assumption.

It should be emphasized, however, that our interpretation of economic is quite broad. Specifically, it is understood that economic welfare and the degree to which children affect the welfare of a family unit are inextricably bound to the nature and degree of integration of the family within the village and larger society. Inasmuch as children function to strengthen or otherwise affect the social relations of a family unit to other individuals or corporate groups within the village, then these functions bear on the economic welfare of the family.

The task of the present research is, first, to document the benefits and costs of children to families and other relevant corporate groups, and second, to analyze the structural features of village society that affect and permit the diffusion of familial fertility costs, and thereby contribute to the support of high fertility.

Both of these tasks require a detailed understanding of the structure of village society. The objective conditions of rural life (poverty and uncertainty) also dictate the direction of research on village social structure: we shall be interested in

the social relations affecting the distribution of resources and opportunity within the village. It is these relations and mechanisms that most importantly determine the economic welfare of particular family units.

From the existing literature it seems that social relations and corporate groups in rural Bangladesh are organized primarily by kinship, economic class, and faction. Similarly, resources and opportunity are distributed according to rules and contracts specific to these three bases of organization. Control over resources will thus likely be determined by membership and status within kin group, class, and faction. We shall be interested in determining the nature of interclass relations (including terms of employment and land tenure) and the role of children (or family size and composition) in these relations. Similarly, we shall study patron-client relations within kin groups and factions and the role of children in securing access to patronage.'

Operationally, the study revolved around a sample of approximately one-third of the village population. The sample was drawn from the universe of 'parents' (ie sets of parents, each set consisting of either a currently married couple or a once-married but now single parent), with at least one living child age five or older. A random stratified sample of 120 sets of parents was selected from a total population of 335. The population was stratified into three groups according to ownership of arable land, and these strata were further subdivided according to the life-cycle stage of the parents. Only 114 households were represented in the resulting sample because in six cases two sets of parents were drawn from the same household. Although the sampling units were parents, the unit of measurement for much of the data collection was the entire household.

Data collection entailed a variety of methods and degrees of quantification. Having had no training in anthropology, however, I was biased in favour of systematic, structured collection of quantitative data. (I regarded these data as a kind of insurance; something to fall back on in case serendipity, eloquence, and more purely anthropological initiatives failed me.) The fieldwork extended over a period of 20 months and produced an enormous amount of quantitative data (much of which still remains undigested). The major sources of quantitative data were as follows:

1 Household census (entire village), May-June 1976

The census provided basic demographic data as well as data on education, occupation, landownership, mortgage, and sharecropping; sources and levels of income; maternity and paternity histories; and contraceptive use.

2 Economic activities of children (main sample), October 1976.

The purpose of this schedule was to determine the participation of children in a wide range of productive or otherwise useful activities.

3 Children living away (main sample), October 1976

For children living away from the parents' household, information was collected on age at departure, reasons for departure, current residence, frequency of visits, and flow of goods and cash between parents and children.

4 Household assets (main sample), October-December 1976

This entailed a number of different schedules to record household assets and histories of household acquisition and loss of land.

5 Time allocation (main sample households), October 1976-January 1978

Time budgets were collected every 15 days from all members of the sample aged four and above. Data were collected in the form of a sequential record of a respondent's activities and their duration for the 24-hour period preceding the interview. Each round of data collection lasted seven days. After the initial few rounds the budgets were collected by educated village youths, each of whom was familiar with a portion of the sample.

6 Income and expenditure (main sample households), December 1976-January 1978

This schedule recorded income, cash or kind; expenditures on goods and services; sale or loss of assets; and borrowing and lending transactions. These data were collected at the end of each Bengali month by four full-time field assistants. The data were recorded on forms structured according to major income and expenditure categories and the required detail for particular transactions. This detail was later preserved by coding each transaction separately.

7 Food, fuel, and fodder consumption (main sample households), February 1977-January 1978

Administered along with the time budget schedule, this survey collected data on quantity and source of food cooked and consumed the previous day, food taken outside the household, outsiders who shared the household's food, and type and source of fodder and fuel.

8 Agricultural labour surveys (village area), December 1976-January 1978

These surveys focused on particular operations (eg harvesting, weeding, transplanting) and took plots of land undergoing an operation as units of observation. Data collected included type of labour employed, terms of employment, form of wage, and various aspects of the relationship between employer and employee.

Other systematic although less structured or less complete inquiries included: the collection of genealogies; details of procedures, costs, and participation involved in marriages and other ceremonies and formal occasions; documentation of disputes and their resolution; farm income studies; case studies of a variety of other occupations and enterprises; and various efforts to identify local corporate groups, understand their purpose, and define their boundaries. As important as either the specifically structured or the semi-structured surveys and inquiries was the inevitable, steady accretion of knowledge about the villagers and their institutions that resulted simply from continuous exposure to them over a relatively long period. This produced an ability, when confronted with an identification number and some coded quantitative data, to conjure up a reasonably vivid image of an actual villager, along with his or her physical and social setting, a personality, and a history. In my view, it is the latter 'source of data' that provides the necessary perspective for evaluating, integrating, and interpreting quantitative evidence and the backdrop against which to 'reality-test' others' and one's own hypotheses, assumptions, and assertions.

14.5 IDENTIFYING INSTITUTIONAL STRUCTURE

Institutions, loosely defined as rules that govern social interaction, are far more elusive subjects of empirical research than the community attributes that were discussed earlier. They cannot be observed in the sense of noting the presence of a tubewell in a village, except, perhaps, insofar as they are codified. Even in the case of law, however, one must be careful to distinguish actual practice from what is written: the two often diverge and it is the former that is of real interest. Similar problems may occur if one tries to elicit a description of institutional structure in an interview setting. The respondent may have a very clear image in his mind of a particular institution, but that does not mean he could construct a verbal description of it that would be equally vivid to the interviewer. (Try to describe an elephant to someone who has never seen one.) Perspective could well be a problem: institutions are embodied in individual experience by means of roles, and while it is likely that a respondent will be very knowledgeable about roles that he has played, he will be much less familiar with those he has not played.

Institutional arrangements are typically not rigid blueprints of social behaviour, but rather, more or less flexible guidelines that permit a range of behaviour in

a particular situation. In an interview setting, however, one is more likely to obtain a depiction of the modal pattern of behaviour (as perceived by the respondent) than a sense of its variety, and thus, perhaps, come away with an exaggerated view of institutional rigidity. An analogous problem arises in situations of institutional change or flux. For example, when a traditional system of labour compensation (fixed harvest shares or hereditary rights) is supplanted by market-determined wages, the transition will not occur instantaneously. In the midst of change, the old and new are likely to co-exist and combine in complicated ways. Similarly, bits and pieces of an 'official' national legal code may vie for institutional legitimacy with quite different precepts of local customary law. The identification of institutional structure will be particularly difficult in these situations.

Institutional structure is likely to be reflected in language and local usage. As part of the process of institutionalization, institutions and the roles of relevant actors acquire special names. (Hence, for example, the anthropologist's interest in kinship terminology.) In order to elicit useful information about institutional structure from a respondent, one may first have to gain access to the specialized vocabulary. To illustrate the potential importance of institutional vocabulary I draw once again on the Bangladesh Fertility Survey community questionnaire. I mentioned earlier that the final section of the questionnaire posed a number of open-ended questions on social dynamics. Several of these questions were intended to measure the relative cohesiveness of villages. According to my reading of the literature at that time (which consisted of only a handful of village studies), one distinctive feature of rural social organization in Bangladesh was loosely structured patronage groups called *samaj*. Samaj function as solidarity groups with members bound both by patron-client ties and by the collective celebration and observance of various religious and social occasions. Samaj also often function as political factions. The community questionnaire sought such information as the number of samaj in the village, their size and the religion of the membership, and the extent of conflict between different samaj. As I said, I soon lost touch with the BFS, and I have no idea what kind of information these questions produced. However, I carried similar interests into the village study and one of the first things I tried to do after taking the village census was determine the number of samaj in that locality and to identify the membership of each.

This turned out to be a fairly laborious process, one complicated by the inconsistency of responses concerning who belonged to which samaj. It was only after a

week of frustrating effort that we discovered that the local name for the patronage group I had in mind was not *samaj* but *mallot*. *Samaj*, literally translated, means 'community'. It is a word in Bengali with as many connotations as 'institution' in the English language. When asked to which *samaj* they belonged, villagers replied according to their idiosyncratic interpretation of what we meant by community. Some interpreted this to be the *mallot*, but others clearly had different communities in mind — neighbourhoods, for example, or kinship groups. This explained why we were getting inconsistent responses. (Incidentally, to complicate matters further, the Bangladeshi assistant who was helping me came from an area in Comilla District where the local name for this patronage group is neither *samaj* nor *mallot*, but *reyai*. At the beginning of our inquiry he did not have a clear idea of what I meant by *samaj* either.) Once we had the right word, people knew exactly what we meant and determining *mallot* membership presented no problems.

In my work, I have been particularly interested in the implications of institutions and institutional structure for the economic value of children. The monetary value of goods and services transferred between parents and children does not by itself tell one very much. It is the institutional setting that determines the significance and value of such transfers. One can think of a farmer and his wife as facing a number of problems for which they must find solutions: they need labour to run the farm; they need insurance against a variety of contingencies; and they need to make some provision for the future when they are too old to work. Children may provide the solution to all of these problems; however, the necessity and value of their contributions in these areas depends importantly on whether alternative solutions exist. For example, the evaluation of child labour will depend on institutional arrangements governing the allocation of labour. In the absence of a labour market, in which case the family is the exclusive source of labour, a much greater value may be placed on child labour than would be true in the presence of an active market, even if the quantity of child labour supplied is the same in the two situations. Similarly, children may represent a very imperfect source of insurance against risk; however, if there are either no alternatives to children or only inferior alternatives, they will nevertheless be highly valued for the security they provide (Cain 1981). Institutional structure will influence not only the available mechanisms of adjustment to risk but also the level of risk and the need for insurance. This is the case, for example, where the security of property rights depends on strength in numbers. Institutional structure also affects the costs of children. For example, labour market structure will

influence the so-called time costs of child care. Time costs are usually quantified by the 'shadow price' of time — the market wage rate that a person can command. In Bangladesh, market structure is such as to severely constrain the employment opportunities of women. Their labour market participation and wages are extraordinarily low. The time costs of child care to women (measured in this way) are thus negligible (Cain *et al* 1979).

I have used a variety of kinds of data (with varying degrees of success) in trying to flesh out institutional structure in rural Bangladesh (and India) as it pertains to different arguments and lines of research. My approach has generally been to focus on the way things actually work rather than people's perception of how they work. The quantitative data that are most directly relevant to institutional form are data on transactions of various kinds and partners in transactions. Some examples follow.

It is often thought that extended families function as insurance co-operatives in traditional societies. To see whether this held true for Bangladesh, or, rather, to determine limits of the mutual obligations of kin, I looked at the pattern of land transactions and partners in land transactions (Cain 1982). Rural Bangladesh has a high-risk environment. It also has a very active land market: a great many land transactions result from the distress sale of land. This is a highly undesirable but important means of adjustment to risk in this setting. Of all land sale transactions that were recorded in the village (see 4 Household assets, above), 80 per cent could be classified as distress sales — sales for such purposes as purchasing food or medicine. Networks of kin are not necessarily an effective form of insurance, particularly if all members of the network are equally affected by a disaster. Therefore, one might observe a high frequency of distress sale even where kin are closely knit and committed to one another. If this were the case, however, one would not expect to find a large number of such transactions taking place between brothers or other close kin. A brother with enough cash to purchase land is also in a position to lend his brother the same amount or to give it to him outright if he so chooses.

Table 14.1 shows the distribution of land transactions in Char Gopalpur according to kinship relation of the partner in the transaction. It shows that 40 per cent of all recorded transactions took place between close kin: 18 per cent between brothers and 22 per cent with father's brother or father's brother's son. I concluded from this that the extended family functions rather poorly as an insurance co-operative in this setting.

There is little agreement about the essentials of

Table 14.1 Land transactions by kinship relation of partner, Char Gopalpur Village, Bangladesh^a

Partner	Type of transaction			
	Purchases	Sales	Total	%
Brother	41	59	100	18.0
Father's brother or father's brother's son	66	58	124	22.3
Other patrilineal ^b	6	2	8	1.4
Related through wife, mother, or daughter's husband ^c	38	32	70	12.6
Non-relatives ^d	154	82	236	42.4
Not specified	12	6	18	3.2
Total	317	239	556	100.0

^aTransactions undertaken by the male head of household, or, in the case of female-headed households (all widows), undertaken by the widow or her deceased husband, in a random sample of 114 households. Included are all transactions between the date of inheritance and the date of interview (1976).

^bFor example, father's father's brother's son.

^cFor example, wife's father, mother's brother, daughter's husband's father.

^dDue to recall error, insufficiently persistent questioning, or difficulty in reckoning distant kin, some transactions involving kin relations were undoubtedly placed in this category by mistake.

labour market structure in rural south Asia. The literature provides widely different descriptions of rural labour processes for the same geographical area – ranging, for example, from freely competitive market models to models in which non-economic factors determine employment and wages. Theory construction has in fact completely outstripped empirical work that could resolve many of the current debates. A number of theories posit the tying of labourers to particular employers. Tied labour might result from a concentration of power in the market (monopsonistic conditions, for example, which could result from the dominance of a single large landowner/employer) or from interlinked factor markets (bonded labour, for example). Tied labour could also reflect the enduring strength of patron–client ties. The presence or absence of labour-tying thus provides an important clue to institutional structure.

Table 14.2 represents a cross-tabulation of days worked in the daily labour market by 40 poor adult males according to the number of different employers for whom they worked. These data were taken from the time budget schedule (see 5 Time allocation, above). When the time budgets were recorded, in the case of wage labour, additional information was collected on the identity of the employer and the terms of the contract. Each of the 40 males was recorded as having worked at least 10 days in the labour market out of the total of 25 days for which they were observed. The main grid in table 14.2 (columns 1–9

pertains only to days worked in the village. (Only 32 of 40 males are represented in this grid because 8 males worked all days outside the village; in all, 38 respondents spent at least one day working outside the village.) The vertical shading indicates the pattern one would observe if each labourer were tied to a single employer. The diagonal shading indicates the pattern one would observe if each labourer worked no more than one day for any one employer. Even in the case of a completely free market, one would expect some redundancy in employers due to proximity and chance; therefore it is unlikely that one would observe a perfect diagonal pattern. In fact, the observed distribution of workers ‘fits’ the diagonal much better than the vertical pattern, which suggests there is relatively little tied labour in the village. The labour mobility indicated by the number of days of employment outside the village (327 of a total of 533) is consistent with this conclusion.

One of the great advantages of intensive village studies is the opportunity to pin down the identity and characteristics of partners in a wide range of transactions. Data collected from diverse sources can be cross-referenced through a consistent system of household and individual identification numbers. For example, the mallot membership list was used in a subsequent analysis of wage determination (Cain and Mozumder 1981). That analysis relied primarily on data from agricultural labour surveys (see 8, above). Cultivators and hired labourers from those surveys

Table 14.2 Cross-tabulation of labourers by days worked in the daily labour market and number of different employers, for 40 men, each with 10 or more days in the labour market out of 25 days observed, Char Gopalpur, 1977

Number of days in the labour market	Number of different employers (employer resides in same village)								Employer outside of village	Employer location or identity not ascertained
	1	2	3	4	5	6	7	8	9	
1	III								III	III III I
2									II	III II
3		II ^a	III						III	III
4		I	I	I					III	I
5		I		I					II	II
6										
7			II	I	II				II	
8		I			I	I			III	
9						I	I		III	
10			I						II	
11						I	I		I	
12										
13									I	
14										
15									III	
16								I	I	
17							I			
18 +									III	
Man-days (column totals)	4	23	40	16	22	28	37	16	327	54

^aThese are frequency counts. In this case, 2 men spent 3 days each working for 2 different employers.

were matched with their census identification numbers so that analysis of wage contracts could be supplemented by data from other sources. With the mallot lists, it was an easy matter to determine whether particular employer/employee pairs were members of the same mallot, and then to see whether common membership affected wages. (Common membership does appear to have a slight positive effect on wages.)

14.6 CONCLUSION

Social institutions have both objective and perceptual dimensions. Because they produce regularities and distinct patterns of behaviour between categories of actors, their objective dimension is at least partially accessible to observation and measurement. However, institutions are purely social constructs. They exist only insofar as they are accepted and internalized by a community of individuals: 'By playing roles, the individual participates in a social world. By internalizing these roles, the same world becomes subjectively real to him' (Berger and Luckman 1967). In my work I have given far more attention to the objective side of institutions — the 'tangible' incentive structures bearing on fertility — than to their subjective and perceptual dimension. Evidence, for example, of high risk, a dearth of alternative forms of risk insurance, and the effectiveness of children as a means of adjustment to risk, together have been used to infer that demand for insurance motivates high fertility in certain developing country settings. Left to assumption in this line of reasoning, of course, are people's attitudes toward and perceptions of risk and their perceptions of the adequacy and availability of insurance. Also implicit in the inference is a strong rationality assumption and a particular model of reproductive decision-making. In the context of Bangladesh, the inference may be correct: here one is dealing with hazards that either are life-threatening or have severe economic consequences. In general, however, I have concluded that one cannot safely neglect the perceptual environment of fertility decisions, and that research capable of investigating and integrating both the perceptual and the objective dimensions of institutional context holds the greatest promise.

I do not think that large-scale surveys, employing highly structured, pre-coded questionnaires, can contribute very much to an institutional analysis of fertility. To carry out such a survey requires one to have a high degree of structure in questionnaire design in order to produce reliable data. However, in order to

structure usefully a questionnaire one must have a very clear idea of what one is trying to measure. (Relevant data must also be reducible to a form that permits pre-coding.) With respect to the determinants of fertility (excepting the proximate determinants), I do not feel that we know enough at this time usefully to approach the topic with such a research instrument.

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15 Improving the Collection of Village-Level Data: An Experience from Thailand

Napaporn Chayovan and John Knodel

15.1 INTRODUCTION

It has been generally recognized that existing community-level data and demographic research of contextual effects using such data lag behind other areas of demographic research. Several explanations have been given as major reasons for the generally disappointing results of research utilizing community-level data. The narrow focus of most community-level questionnaires, inaccuracy of the data collected, the lack of appropriate data for index construction, the questionable validity of the constructed indices and of the model specified for testing, and the inappropriateness of the methodologies of the data analysis are some examples of the difficulties. Some critics go further and question whether community-level data relevant to demographic behaviour can be obtained at all from the approach usually employed, namely use of a community questionnaire administered during a brief visit to the village. They argue instead that the collection of information on the truly relevant parameters would require a far lengthier stay in the village to study the nature of the community and how it functions through participant observation and in-depth interviewing of key informants. Satisfactory solutions to these problems have not yet been achieved.

This paper reports on our recent effort in Thailand to improve the quality of community-level data including a special effort to improve the accuracy of data on availability and accessibility of modern contraceptive methods. We worked within the conventional community questionnaire framework but incorporated several innovative features designed to improve the quality of data yielded. The specific nature of our community-level data collection effort is somewhat unusual in that it focused primarily on obtaining information about conditions in the past (as opposed to current conditions) to link to three individual-level surveys which took place in 1969, 1972 and 1979 and because it emphasized determining availability of and accessibility to sources of contraception. Nevertheless,

we believe a number of features of our approach are generally relevant for community-level data collection efforts. Moreover, information on changes over time in community conditions is potentially useful even when the community-level collection effort is linked to a simultaneously conducted individual-level survey as is the usual case. Thus our experience with the attempt to obtain data on conditions in the past may also be of general interest. Likewise, detailed information on contraceptive availability and accessibility is often of interest to researchers conducting fertility surveys.

The specific features of our community-level collection effort that we incorporated into our study design in order to improve data quality and which depart from the more usual approach are as follows:

- 1 Extensive pre-testing of the community-level questionnaire;
- 2 Use of a team of interviewers specifically trained for the purpose of administering the community questionnaire;
- 3 Administration of the community questionnaire through a group interview, generally with two interviewers and three or more respondents;
- 4 Visits to local family planning outlets identified in the group interview to confirm and collect information on methods distributed and duration of availability; and
- 5 Collection of community-level data from external sources before the administration of the questionnaire to serve as aids for probing and cross-checking answers as well as to be incorporated into the dataset.

Before we proceed to a discussion of the rationale behind and experience with each of these modifications, we review briefly the background of the recent Thai village-level data collection effort and discuss in more detail the content and construction of the questionnaire.

15.2 BACKGROUND

Thailand is unusual with respect to its demographic transition. The country has experienced a remarkable increase in contraceptive prevalence and a decline in fertility within a short period of time (Knodel *et al* 1982). These demographic changes coincided with the development and expansion of the National Family Planning Programme as well as changes in the nation's socio-economic conditions. Fortunately a series of national demographic surveys were conducted which capture much of the period of the fertility decline. These surveys include two rounds of the National Longitudinal Study of Social, Economic, and Demographic Change (LS1 and LS2) of which the rural phases took place in 1969 and 1972, the Survey of Fertility in Thailand (SOFT) in 1975 which was part of the World Fertility Survey, and the National Survey of Fertility, Mortality and Family Planning (NS) in 1979. The rural phase of each of these surveys except LS2 included collection of information on village profiles which could be used for cross-sectional analysis of the association between village characteristics and reproductive behaviour. An exercise employing SOFT individual-level data in combination with SOFT community-level data to examine the importance of a village's level of socio-economic development and family planning availability on reproductive-related behaviour of rural Thai women proved to be disappointing; one contributing factor was undoubtedly inadequacy and imprecision of the community-level information which was probably attributable to poor questionnaire construction and methods of data collection (Chayovan 1982). Since the village profile questionnaire and data collection approach of LS1 and NS do not differ much from the SOFT community survey, similar problems are likely to be encountered in analyses using the originally collected village-level data for either survey.¹

Given the coincidence in timing of the development of the National Family Planning Programme and the increase in contraceptive use, there is considerable interest in exploring the relationships between objec-

tive availability and accessibility to family planning services at the community level and contraceptive use at the individual level. Because of the problems discussed above, the community-level data collected in connection with the surveys spanning the period of reproductive change were judged to be inadequate for the task and a new and independent community survey was undertaken to collect detailed and comprehensive information on availability and accessibility to various sources of contraceptive services as well as on socio-economic and cultural conditions of the sample villages in three related, successive surveys, namely LS1 (1969), LS2 (1972) and NS (1979). This set of three surveys was chosen both because it spans the period of major reproductive change and also because the three particular surveys have the unique advantage of including a number of the same villages. It is well suited as a basis to examine both cross-sectional relationships at three points in time as well as the impact of change in village-level contraceptive availability and development on reproductive change. The project is being carried out by the Institute of Population Studies, Chulalongkorn University. Preparations and pre-testing took place in September through December 1982 and fieldwork was carried out during January through March 1983.

15.3 QUESTIONNAIRE CONSTRUCTION AND CONTENT

The content of the questionnaire for the recent community survey was developed on the basis of the objectives of a larger project, of which it is a part, which focuses on the determinants of fertility levels and change during recent years in Thailand. The questionnaire has two unusual features: (1) it focuses on conditions at several different points of time in the past corresponding to the dates of the individual-level surveys to which the data will be linked and (2) it attempts to get unusually extensive data on actual contraceptive availability and accessibility at those times. Indeed over a third of the questionnaire is devoted to obtaining information about potential sources of contraception with the remainder dealing with socio-economic conditions and cultural characteristics.

Because of the need to obtain information on conditions during several points of time in the past, numerous retrospective questions are included requiring respondents to recall conditions during different years and to account for changes occurring in between. The

¹Note should be made that the SOFT community questionnaire was administered with relatively little guidance from the WFS. It is not known whether the Community-Level Data Module was made available at the time of SOFT community questionnaire construction. While the SOFT fertility schedule seems to strictly follow the format of the WFS core questionnaire in terms of its content, structure, wordings, and question sequence, the SOFT community questionnaire departs from the WFS version in almost all those respects and follows, almost without change, the community questionnaire used in LS1.

original intention was to ask questions about conditions starting with the present then successively about 1979, 1972 and 1969 (the three years for which we had individual-level survey data). Our pre-tests, however, indicated that such a procedure required too much time and more exact recall than was realistic to expect. In addition, it made the interview extremely tedious. We thus decided to ask about only two points in time (4-5 years ago for all questions and 11-12 years ago or 14-15 years ago depending on the particular question) and about the timing of changes that occurred in between. In practice, however, we usually still asked about the current situation before advancing to the periods on which the questionnaire focused, since otherwise respondents tended to give answers in terms of the present if we started by asking about conditions several years ago.

We believe we had mixed success in our attempt to ask about the conditions in the past. Questions about distinct, major events, such as when electricity first came to the village or when a given road was built or paved, appeared to be answered with considerably more confidence than questions about conditions which develop as a process rather than at a single point in time, such as population size or the extent of use of fertilizer, or questions that involve more mundane changes, such as changes in bus fares. Indeed there were a number of items for which it seemed difficult to get accurate information even for the present and thus even more difficult for periods in the past. For example, precise information on the proportion of the village population who worked outside the village in factories or the proportion who read newspapers was difficult to elicit unless there was consensus that no-one did so. Nevertheless, we feel it is feasible to obtain retrospective information on at least some fairly important aspects of village conditions and that it is worth considering attempting to do so when collecting village-level data, especially if the group interview approach is used as discussed below.

Information about the size of population and number of households in the village are necessary for computation of rates or proportions which could then be used for comparison across villages. Unfortunately, accurate data on these were difficult to obtain. The main problem was the lack of a good record system. The problem of obtaining retrospective estimates was particularly serious where there had been a change in the village headman. In general the village headman was able to give only rough or rounded figures of the population and household sizes of the village, usually in terms of the *de jure* rather than *de facto* figures. Although some information was available from other sources for cross-checking, data on the size of popu-

lation and number of households in the past appears to be rather imprecise. This problem is all the more serious because of the difficulty of obtaining information directly in the form of a 'proportion' or 'per cent'. Informants seem to be more familiar with absolute numbers and have difficulty translating these into rates or proportions. The most desirable information for comparative purposes is in the form of a per cent, or, alternatively, the relevant numerator and denominator, but as noted above these may not be easy to obtain accurately. An alternative that we attempted to use was closed questions with scaled answers such as (1) all or almost all (2) more than half (3) about half (4) less than half (5) very few (6) none (7) other (specify). Such a scale is necessarily arbitrary and subjective but may be better than having no information at all.

The project placed considerable emphasis on obtaining accurate and detailed data on family planning availability and accessibility. We are interested in determining not only the conditions at the time of each survey but also how long various methods were available and under what conditions of accessibility. It should be noted that we are concerned with objective (actual) rather than subjective (perceived) availability and accessibility. Although there were limited activities of family planning services before the official date of the National Family Planning Programme in March 1970, there is little point to ask about activities before 1970 for most villages. Moreover, once the date of establishment of a particular outlet for a family planning source is determined, we are generally able to know with reasonable accuracy which methods were available from the outlet and when the method was first available, since methods provided were determined by national policy of the Ministry of Public Health. There is apparently little local variation in actual timing of implementation of these policies. For example, a national directive to permit midwives and nurses to distribute the pill was implemented in 1971 essentially throughout the country (Rosenfield *et al* 1982). Thus if a midwifery centre or township health centre was established before 1971, we can fairly safely assume that pills were available through it since some time during 1971.

Our strategy for obtaining the detailed data on contraceptive availability and accessibility was to ask systematically about each potential government and private source: midwifery centre, township (tambol) health centre, district (amphur) health centre, hospital district, provincial, other governmental and private), private clinic, mobile health units, community based volunteer depot and first class drugstore.

Questions on the location and date of establishment

of the nearest source of each type together with questions on methods provided yield information on actual, method-specific availability of services. Distance, travel time, means of transportation and travel cost to each type of health outlet elicit the degree of accessibility of the services.

The major sources of contraception in rural Thailand are outlets of the Ministry of Public Health, which function as sources of health care generally and not just as sources for family planning. Villagers almost always know the location of the nearest health centre outlet of each major type. Occasionally, however, they may report about the health centre which most villagers patronize even though it might not be the nearest in terms of distance. Thus there is a slight element of subjectivity even in our attempt to get objective availability and accessibility data. Informants may not know the location of the nearest private clinic, private hospital, drugstore or community based volunteer depot if such sources are distant or rarely used. They may also not know the specific methods available, especially when informants are males or elderly persons. The exact year of first establishment of each type of outlet was also clearly a problem because it relied on the informants' memories about an event typically some years ago.

One common problem with questions on cost of travel and usual mode of transportation to the nearest health outlet of each type was that the informants frequently gave as their initial response the mode of transportation they take when there is a serious illness, because they view patronage of such places as motivated by a need for health care (especially emergency care) rather than a need for contraceptive supplies. It was thus essential to probe for the usual mode and cost of transportation. If different people use different modes, eg some walk while some use a bicycle, it is necessary to probe further as to which mode is more commonly used. In many cases more than one mode of transportation is required to travel to the health outlet and the particular combination of those modes needs to be ascertained as well as the combined travel fares and travel time.

Distance and particularly travel time can change over time as new roads are constructed and more efficient modes of transport are available. Thus questions about such changes need to be asked, if contraceptive accessibility in the past is to be measured. To be able to measure more precisely the level of difficulty in accessing the health outlet, travel time should include waiting time in cases where a combination of transport modes is needed to reach the destination. Other dimensions of accessibility for which some information was obtained were road conditions

and frequency of transportation. As responses to our questions clearly indicated, accessibility is a complex, multi-dimensional concept and not easily reduced to a simple measure. Moreover, it clearly has been changing rapidly in recent years in Thailand.

15.4 DATA COLLECTION PROCEDURES

The collection of community-level data is usually a supplemental activity during the fieldwork of the individual-level survey. Often a supervisor or an interviewer is assigned the extra task of interviewing a village headman or leader about village conditions, using a pre-designed questionnaire. (This description typifies surveys within the WFS programme). As such, it is likely to be poorly implemented because of insufficient emphasis on the significance of village-level data and inadequate preparations with respect to questionnaire construction, pre-testing of the questionnaire and procedures, and training of interviewers on how to administer the questionnaire. Thus the usual approach frequently results in data of questionable validity, a fair number of 'don't know' responses, and possible failure to administer the questionnaire at all in some villages.

In our recent village-level data collection effort, we consciously tried to overcome the usual shortcomings of village-level surveys and to introduce several new features in the data collection procedures to improve the quality of data yielded. We felt this was particularly important in our current survey, given the greater probability than usual of obtaining inaccurate data because most questions relied on informants' memories. Since our present effort was independent of the fieldwork of the individual-level surveys, all of which took place years earlier, we had an unusual opportunity to concentrate on ways of improving community-level data collection and to experiment with new procedures. We believe our experience has considerable general applicability. Each of the five new features mentioned in the introduction are discussed in more detail below.

Extensive pre-testing of the questionnaire

In the usual survey which includes a supplemental village-level data collection effort, the village-level questionnaire is likely to be pre-tested, if at all, only in the one or two villages where the individual questionnaire is being pre-tested. The result is that many ambiguities and problems with the village question-

naire are usually not obvious until fieldwork is well underway, making modification of the questionnaire awkward. We originally anticipated one pre-test on several villages but eventually conducted three series of pre-tests. We found that after each pre-test series we needed to modify the questionnaire substantially in the light of problems that became apparent during the pre-test. Moreover, as a result of our pre-test experiences we made modifications in the procedure for administering the questionnaire, the most important being the use of the group interview as described in detail below. Despite the fairly extensive pre-testing, problems with our questionnaire continued to surface as we carried out the actual survey and now as we carry out analysis, indicating that even more pre-testing would have been useful. Nevertheless our questionnaire and procedures are clearly superior to what would have been the case had we done no pre-testing or pre-tested only once.

Use of a specially trained team for village-level data collection

The usual procedure for collecting village-level data in connection with an individual-level survey is to assign responsibility for administering the village-level questionnaire to the supervisor of the interview team. The supervisor may conduct the interview himself or assign it to some interviewer in the team. In either case, it is often squeezed into an already hectic schedule, with the result that there may be no serious attempt to follow up an interview where the initial attempt is not successful or efforts to administer the village questionnaire may even be skipped altogether because the supervisor had other fieldwork activities to fulfil which he considered as more important. Moreover, since there are usually several interview teams and since there is often no special training concerning village-level data collection, different people with different understandings of what the village questionnaire is attempting to get at or with different skills or determination in carrying out this aspect of the survey end up administering the questionnaire. The problem is often made worse by the fact that any given survey includes only a limited number of villages and thus no one interviewer may accumulate more than fairly limited experience in administering the village-level questionnaire.

Our experience indicates that administration of the community questionnaire requires considerable skill on the part of the interviewers and that the types of problems encountered may be quite different from those characterizing the main survey interviews. This is especially true if the group interview approach des-

cribed below is adopted but is also due to the quite different nature of questions being asked. We believe the collection of village-level data is best assigned to a small team of interviewers specifically trained for the purpose and whose main responsibility is precisely this task. It is important in our experience to ensure that the interviewers fully understand the purpose of each question, as often considerable probing was necessary to obtain the desired information. Use of a special team not only minimizes variation among interviewers but also allows the interviewers to increase their skill and experience as the survey proceeds, thereby improving the accuracy of the data collected. Unlike the usual survey of individual-level data, in which the interviewers become familiar with the questionnaires within a few days because they interview several respondents per day, the interviewers of the community surveys have far fewer opportunities to practise as the number of villages involved is not large and much time is spent travelling from one village to another. In our recent project, we employed four interviewers forming two teams to collect the village-level information. Generally the project leader or a senior colleague was in attendance at each interview as well. Depending on the complexity of the questionnaire it may be necessary for senior staff to accompany the interview teams, at least initially. This has the added advantage of giving more prestige to the team and thus aiding in getting co-operation from village leaders.

Another advantage of assigning a special team the sole responsibility of village-level data collection is that it ensures that attempts will be made to collect such data in all villages. For example our current village-level data project, carried out as a completely independent survey, resulted in 100 per cent coverage. When a special team is not involved the person responsible may be too busy to gather the village-level data or may forget to do so. Such has been the case in previous surveys in Thailand.

Conducting a group interview

The conventional approach is to rely on a single informant, usually a village headman or leader. This can be a serious limitation in the collection of community-level data. The method assumes that the village headman or leader is knowledgeable about all relevant features of the village. This may not be true, especially if the informant is very old, only a recent resident, uneducated, or unco-operative. In instances where a preferred informant is not available, the selection of a substitute informant in most community-level data collection efforts is generally left to the interviewer's judgement. As a result, the quality of data collected

may vary greatly depending on who serves as informant.

In our first few pre-tests of the questionnaire, we conducted separate interviews with two leaders of the same village. As expected, some responses were inconsistent, and it was awkward to reconcile the discrepancies by returning to confront the informants with their disagreements. Our experience also indicated that it is not always the case that the village headman or the selected informant is knowledgeable about all aspects of the village asked about in the questionnaire. Thus a group interview approach was substituted and has proven to be a reasonable strategy for improving the quality of data and the response rate per question. Instead of relying on one informant, two interviewers interviewed several informants (usually at least three and sometimes more than ten) as a group. The qualified informants generally included the current village headman, a former or assistant village headman, a teacher, and village council members. Because the questionnaire contained retrospective questions, a major additional criterion was that the duration of village residence be preferably 10 years or more. In fact, this criterion could well be applied to other community surveys, particularly if questions about change in the past are asked. Even where such items are not included, longer residents should be more knowledgeable, everything else being equal.

Several informants are likely to serve as a better source of information than one informant, for two main reasons. First, different questions require different areas of familiarity and having a group of informants increases the chance that at least one will know the answer. It was evident from our experience that the village headman, the conventional choice for a single informant, was not necessarily knowledgeable about all matters in our questionnaires, particularly if he was newly appointed. We also found that selecting informants of different generations facilitates obtaining information about changes. Secondly, informants can and do help each other out when answering questions. Frequently, several informants will respond to a given question, and when they disagree initially a discussion typically ensues leading to some consensus which we believe is usually the most accurate answer. A typical example of the process of reaching a consensus is as follows (based on a tape recording of a group interview with about 10 informants):

Interviewer:	How long did it take to travel from the village to the hospital 4-5 years ago, that is in 1979?
Informant:	About two hours.
Informant:	Less than two hours.

Other informants:	Less than two hours.
Informant:	One hour.
Informant:	No.
Informant:	Of course one hour.
Informant:	Believe him he was a bus conductor before.
Informant:	Two hours.
Informant:	If we started from our village it took more than two hours.
Informant:	More than two hours.
Informant:	Now it takes 30 minutes.
Informant:	It takes 30 minutes by bus now.
Informant:	All right, it was two hours because the bus had to stop.
Interviewer:	Yes, you should count the time the bus stopped to pick up passengers in 1979.
Informant:	About two hours.
Interviewer:	Is it two hours then?
Several informants:	Yes.

We originally attempted to include the wife of the village headman or some other woman as an informant because several of our questions were about family planning services and we expected women to be more knowledgeable in this area. In implementation it proved difficult to get a woman to actively participate in the discussion with a group dominated by males and finally we abandoned this attempt. Another problem that arose was that very elderly informants sometimes appeared to have impaired memories due to advanced age.

A primary motivation for having two interviewers conduct the group interview was to minimize errors due to failure to ask a question, insufficient probing, and recording errors. The procedure followed was to have the two conduct the interview interactively, taking turns asking questions but each recording the answers in separate questionnaire booklets. The approach requires an interviewer with note-taking skills in addition to interviewing skills. In the course of the interview each can help the other out when a difficult situation is encountered. They can also help ease the atmosphere of the interview. Rather than relying on only one interviewer to record the information, having both do so permits the two completed questionnaires to be compared for consistency. This has proven to be a good strategy particularly when a question does not elicit an immediately agreed upon answer. The discussion among informants may confuse the interviewers and an answer may be prematurely recorded before consensus occurs. Having both interviewers fill out the questionnaire and then compare

answers at the conclusion of the interview before departing helped reduce this problem.

Another procedure we followed in the group interview was to tape record the entire session to help in recording answers accurately and completely. Although having two interviewers also helps in this respect, tape recordings can supplement and clarify some conflicting answers recorded by the two interviewers that are not noticed at the time of interview.

Despite the above-mentioned advantages, there are some disadvantages to the group interview approach. First, there is the problem of waiting time. Unlike the individual interview, a group interview requires time to recruit the informants. In our experience, the waiting time ranged from about half an hour to over an hour. Secondly, there is variation in the qualification of the informants, which in turn affects the quality of data. Although we have eligibility criteria for selecting the informants, the actual recruitment is generally done by the village headman or his assistant. The selection is generally based upon availability at the time of interview. Both of these problems can be minimized by making advance appointments and explaining to the village headman or his assistant the type of informants needed. We frequently were able to do this and found it facilitated recruitment of informants considerably. In general, we located well qualified informants and the discussion usually went smoothly. A third problem is that a group interview extends the time of the interview, since questions often elicit discussions among informants. Indeed this is one of the main reasons for the group interview as it is the way more accurate information is obtained.

Visits to local health centres

As indicated above, a major concern of our recent village-level data collection effort was to obtain accurate and extensive information on availability of and accessibility to contraception. We were reasonably confident that we could identify the major local sources of contraception through the group interview but were less hopeful that we could obtain accurate information in this way on the date each source was established, which methods were available, and when they became available. Indeed, we generally found that village leaders had quite limited information on these matters (no doubt in part because they were older males). We therefore decided to collect information on the history of the outlet and contraceptive methods available directly through each local outlet. In addition, the visit was used to verify the distance to the outlet, one critical aspect of accessibility. We chose out of practical

reasons to visit only local outlets, primarily the nearest midwifery centre, township health centre and district level source. Visits to provincial hospitals would have been too time consuming and were deemed unnecessary, since virtually all provincial hospitals were established before the start of the Family Planning Programme and are known to distribute all major methods. Private clinics and drugstores were also not visited but they are known to be unimportant sources of contraception for the rural population (Kamnuansilpa and Chamrathirong 1982).

Some problems were encountered at the visits to the specified outlets. The first problem was the unavailability of the personnel at the time of visit despite several attempts to contact them. Unlike the village interviews, appointments cannot be made in advance because the specific outlets are identified only at the time of the village interview. Secondly, the information we needed also depended on the informants' memories, unless adequate records were available at the health outlet which was not always the case. This becomes a problem especially if the informant is new at the health centre. He or she is not likely to be able to give information about the past, particularly if records for more extended periods in the past are not retained. Visits to several district chief medical offices to clarify uncertain information was not very useful usually. In general record keeping is inadequate for our purposes. The specified health outlets which were not successfully interviewed at the time of fieldwork were followed up by mailed questionnaires with a return pre-paid envelope. The final response rate is not yet known at the time of writing but the responses already received indicate that some but not all the desired information can be obtained through mail follow-up.

These problems are not as serious in our case as they might be for two reasons. First, the Ministry of Public Health has published a directory of all health centres with either the date the centre was established or the date it was upgraded to its present level. This has helped us in determining the date of establishment and in cross-checking responses. Some errors and omissions in the data are evident, but generally the directory has been very useful. A problem occurs, however, when the date of upgrading rather than date of establishment is given since it is the latter which interests us most. From our point of view, if the upgrading occurred before the start of the National Family Planning Programme, this is also not a problem as we are chiefly interested in how long contraceptive services have been available. Knowing that the centre existed at the start of the programme is sufficient for our purposes. Secondly, as mentioned above, national policy largely determined

what methods were distributed at what types of outlets as well as when they were first available. Thus by knowing the type of outlet and the date of establishment, we generally have a good idea of what methods have been available and for how long.

Use of external sources of village-level data

As a method to increase the chance of obtaining reasonably accurate data, we have also exploited some external sources of village-level data, both to help cross-check answers in the interviews and to serve as a source of probing and a source of information to be incorporated directly into the village-level dataset. The use of the directory of health centres from the Ministry of Public Health has already been discussed in connection with the visit to health centres. We also obtained in advance information from the head organization of community-based contraceptive distributors on which sample villages were supposed to have village distributors and when village-level distribution began.

Other sources used include 1974 and 1979 versions of unpublished village-level data collected yearly by the National Statistical Office and village-level data recorded by the Community Development Office of the Ministry of Interior for 1979. Unfortunately, data from the latter source are only available at the local office, which meant that we had to collect these data at the time of the fieldwork. It was disappointing to find out that we were able to obtain this information from this latter source for only 15 of our 64 sample villages and there was reason to doubt the accuracy of some data. In the course of our data collection, we have also utilized our own village-level data collected in 1969 and 1979.

Data from these sources not only can be integrated with the new information collected but can also be used as a cross-check at the time of the group interview. To facilitate this, we pre-recorded all applicable information from these sources in the current village interview schedule in coloured pencil to distinguish it from actual responses. When the informants gave answers at odds with the pre-recorded information, we tried to probe the inconsistency although in practice this proved to be less effective than originally anticipated largely because interviewers were too caught up in the normal course of the interview and often forgot to notice if the responses agreed with the previous pre-recorded information. Better training in this regard would probably largely eliminate this problem.

15.5 CONCLUSIONS AND RECOMMENDATIONS

We feel we learned a great deal about the problems of collecting community-level data during our recent survey and believe that some of the modifications we have made to the more conventional approach have general relevance for future efforts in Thailand and elsewhere. In particular we believe that careful questionnaire construction and thorough pre-testing are essential, that the village-level study is best conducted by a specially trained team of interviewers who have this as their major task, and that a group interview approach enhances chances of obtaining more accurate information. When possible village-level information from external sources should be gathered in advance of the survey for use as a source for checking responses and probing, as well as for integration into the final dataset. Moreover, if data on contraceptive availability and accessibility are sought, efforts should be made to verify or supplement information from the village interview by directly contacting the major local sources.

Several other miscellaneous points stemming from our experience are also worth mentioning. (1) Some thought needs to be given to how villages are defined. In our survey, we defined villages in terms of legal administrative boundaries since this corresponded to the definition used in drawing the original samples. However, in Thailand at least, the legal boundaries do not necessarily correspond to the boundaries of what would sociologically be considered the community within which most meaningful local interactions take place. (2) Familiarity with a rural setting is an asset for an interviewer as it enables him to probe question more intelligently and to comprehend responses more fully. In any event, the interviewers should be astute observers and able to obtain rapport easily with the informants. (3) It is useful to draw a map of the way to the village during the visit. Having a map helps in terms of obtaining information about distance, date of road construction, and routing of travel to major centres.

As we carried out our survey, we never failed to be impressed with how much more complicated the actual conditions of village life were compared to the images we had in mind when constructing the questionnaire. Observation of villages during the fieldwork suggest that there are multiple dimensions to most of the village conditions we were attempting to measure and that the development of meaningful summary indices for such crucial characteristics as contraceptive availability and accessibility or degree of isolation will be a difficult and complicated task. This combined

with the fact that the accuracy of information obtained even on many current conditions, not to mention past conditions, appears to be far from perfect leads us to conclude that researchers should remain quite modest in terms of their expectations and claims for analysis involving village-level variables. We believe improvements to the present approach are possible and hope our recent experience will contribute to that end. Even with the best data collection procedures, however, we strongly suspect that substantial limitations on what can be justifiably done with the data will remain.

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16 Creating Community-Level Data: Experiences in Kenya

Linda H. Werner

16.1 INTRODUCTION

In Kenya a multi-purpose sampling programme was in operation when the Kenya Fertility Survey was conceived, conducted and analysed. This National Integrated Sample Survey Programme (NISSP) was the main vehicle for data collection within the Central Bureau of Statistics between the years 1974 and 1979.¹ Because of its existence, no World Fertility Survey community-level survey was attempted. The Vrije Universiteit in Brussels is studying the relationship between fertility, using the Kenya Fertility Survey, and data aggregated to the community level from other surveys in NISSP. This report focuses on the experiences and problems encountered in the effort to create community-level variables from multiple surveys in a multi-purpose sample survey programme. It is discussion of the process of data reduction necessary and not of analysis.

Brief introductory paragraphs below describe the sample survey programme in general terms, in order to provide a background for those who are not familiar with the NISSP operation in Kenya. Three major sections follow. First there is a description of the data sources. After a discussion of the limitations of the data available, the sample surveys of interest are described. The second section is devoted to a brief explanation of the example chosen for the practical review of the procedures used. Initial theoretical considerations are also presented. The third section discusses the procedures necessary to create community-level variables in the Kenyan situation. The major conclusion is basically that the procedure is more complicated than anticipated. The demands of the added theoretical and practical steps necessary to create a usable file of

aggregated data definitely limit the potential of such an approach.

The Central Bureau of Statistics in Nairobi, Kenya, established the NISSP in 1974. The resultant sample survey infrastructure co-ordinated field staff, professional staff and policy/research objectives. The national sample which was used by most surveys in NISSP was created in 1976. The 32 000 households in this national sample frame represented both urban and rural regions. The field staff consisted of permanent well-trained interviewers, their supervisors and provincial administrative officers. The Central Bureau of Statistics, using this scheme, was able to conduct a wide variety of sample surveys with a great deal of efficiency.

The national sample itself was composed initially of 200 clusters of households. The coverage of this area sample excluded the entire North Eastern Province and the districts of Marsabit and Isiolo in Eastern Province and the districts of Samburu and Turkana in Rift Valley Province. Although large in geographical area, these northern desert regions contained only an estimated 5 per cent of the total population of Kenya. The 120 rural clusters had an average of 200 households each while the remaining 80 urban clusters each contained approximately 100 households. The sampling procedure allowed for valid statistical estimates down to provincial level only.

16.2 DATA SOURCES

Availability and limitations

The Central Bureau of Statistics has published a complete record of the surveys conducted between 1974 and 1979. The document's 153 pages of questionnaire listings shows the enormity of the NISSP undertaking. (The table of contents for this publication is reproduced in appendix A.) Not all of the surveys reached a successful conclusion. Mistakes are inevitable when a

¹ In 1979 a new sample survey programme was initiated by the Central Bureau of Statistics. The National Sample Survey and Evaluation Programme (NASSEP) continues the basic philosophy of an integrated permanent infrastructure. The new national sample is much larger and allows for statistical estimations by district.

new and complex programme such as the NISSP is implemented. Certain variables, and sometimes entire surveys, were withheld from final publication due to poor questionnaire design, insufficient training sessions and manuals, an underestimation of the work and time involved in completing fieldwork, processing and analysis, and limited field supervision.

The overall schedule was planned at the start of the programme. An annual series of Integrated Rural Surveys (there were four in all) formed the backbone of NISSP. These surveys concentrated on the collection of agricultural and economic data from rural areas. For many variables dealing with planting, harvesting, and consumption of food crops and livestock, data was collected weekly, biweekly or monthly. Throughout the period of the IRS series, a number of single-visit 'modules' were developed. There were normally quite concise and focused on a special interest topic so they could be completed during one visit to the IRS household. In addition, there were a number of cyclic modules. For these surveys the interviewer would make repeated visits to the IRS households every four weeks for an entire year period. The IRS series and its modules are therefore all linked to the same households. Finally, there were a number of specific surveys which utilized the infrastructure of NISSP (the professionals, the field staff and the national sample) but were not linked to the IRS households.

Three major obstacles have delayed studies that focus on creating community-level variables (in fact any study integrating different surveys) and all relate to the vast amount and complexity of the data collected. First, the editing of the questionnaires (especially over cycles) both manually and by computer became an enormous task. In many cases the rules to use were not clearly documented or not complete. Validation was an incredibly long and tedious process with many of the surveys being declared 'clean' when the clerical staff had to be dismissed or transferred. Secondly, the preliminary analyses of the major surveys which formed the core of NISSP were extremely difficult to carry out. Even basic household estimates had to be summarized from initial values and cyclic values; for example, to calculate the number of cattle owned by a household one had to consider the numbers bought, sold, consumed, lost and kept throughout the year. Inconsistencies were often found at this stage and further complicated the process of data reduction. Finally, and basically due to the above problems, few in-depth analyses have been carried out on NISSP data. Only the Kenya Fertility Survey and the Nutrition Survey II have, in fact, been analysed in any detail. This means, for example, that few studies of the reliability of the data or of the policy implications of the results have been published.

The data available therefore has limitations. All the information is in the original questionnaire format and not summarized by household or cluster. The mass of information collected creates a labyrinth of possibilities for variable selection. In addition, there are no ready hypotheses to test. If, for example, an analysis of the agricultural data had shown a specific pattern of the livestock composition and number throughout the country, one would obviously attempt to investigate whether the household values and cluster-aggregated values of these variables were also related to demographic characteristics. Finally, one must consider very carefully the choice of variables or combinations of variables to represent each differential to be studied.

From a theoretical viewpoint, one must re-iterate at this point that the Kenyan sample was an area sample, not a sample of communities. Some clusters could be only a small part of the larger 'community' while others could contain more than one 'community'. The implications of aggregating such data at cluster level and then assuming the contextual variable created represents a 'community' characteristic are beyond the scope of this paper.

One final comment must be stated now: no community-level survey was conducted.² Therefore, there are no global variables to be considered. In addition, the contextual variables must be derived completely from the sample of cluster data. No comparisons can be made between the aggregation over individuals and the same variable collected on a community level.

Surveys of interest

Integrated rural surveys

The IRS III was conducted in 1977-8 and the IRS IV in 1978-9. The IRS III sample was chosen from a new listing done in early 1977 and covered 10 per cent of the national sample. The IRS IV maintained the same list of respondents and collected primarily the same data. The structure of the household and its basic demographic characteristics, material assets and land area were recorded at the start of each year. Each survey had 13 cycles of data collection to record seasonal changes of crop production and livestock ownership. During this two-year period households that dropped out of the sample for any reason (perhaps due to death or migration) were not replaced. Basic agricultural data has been utilized from the IRS III because of the higher response rates and the fact that

²This has been rectified for the new national sample programme. A Social Indicators Survey was conducted in late 1982 which collected global variables and individual household characteristics for aggregation.

the Kenya Fertility Survey was also conducted in 1977-8.

During the time period of the IRS IV, four single-visit modules were conducted that are of interest. These were the Non-Formal Education Module, the Division of Labour Module, the Nutrition II Module and the Energy Module. The actual households interviewed in each survey were only subsets of the IRS sample because the target populations differed, making the sample sizes for these surveys less than that of the IRS series.

Single-visit modules of the IRS IV

Non-formal education. This survey requested information from each head of household and each wife of the head about the number of visits made to the household by government extension officers, and the respondents' attendance at farmers' training centres, demonstrations for agricultural or animal production, village polytechnic courses, and training programmes for women.

Division of labour. For this survey, the target population was all female household heads and married females aged over 20 years. Certain socio-economic questions were asked of all respondents and the household composition in broad terms was obtained. The type of work done by these categories of household members was reported.

Nutrition II. Data on weight, height, food intake, sickness and breastfeeding were collected for all children between the ages of 6 months and 5 years. In addition, household information about water sources, sewage disposal and access to a radio were obtained in each household where eligible children were found.

Energy. This short survey collected data concerning the type and amount of fuel consumed by each household.

Labour Force Survey

The Labour Force Survey was a major cyclic survey that was conducted in both the urban and rural areas. Basic data were collected each month about persons not living at the residence but who either contributed to or received support from the household. In addition, each member who contributed to the household and who was present at the interview was asked specific questions about their employment status and conditions. Household information dealing with the production of non-agricultural goods was also reported. In total 13 cycles were completed.

National Demographic Survey 1977

This survey contained only a small amount of data on

each person but was a complete enumeration of the national sample. Basic characteristics of age, marital status, education and parental mortality were asked of all persons visiting the household and each member. Fertility information was obtained from all women present over the age of 12. Use of this data for contextual variable creation is favoured over the use of the Kenya Fertility Survey data because every household was covered.

16.3 THE CONCEPTUAL VARIABLES

The example

There have been two attempts to investigate relationships between data from the surveys mentioned above and fertility and mortality. For each of these a special subset of variables was chosen for further analysis. The first set was selected for an analysis at the household level of women from the National Demographic Survey 1977 with matched household characteristics of the IRS series. The second set was used in the analysis of the Kenya Fertility Survey and community-level data at Vrije Universiteit in Brussels.

For Vrije Universiteit's community-level analysis, the variables were chosen by Ron Lesthaeghe (with guidance as to the reliability and availability) and the creation of the contextual variables was done in Brussels. However, the final selection of the variables in the first set was the responsibility of this author, and therefore the justification and logic used can be explained as an example. The analysis focused on the relationships between differentials in fertility and socio-economic factors. This set of household variables could be matched directly by unique household numbers within clusters and the analysis has only been reported thus far at the household level. For this paper, the basic hypotheses have been extrapolated to an analysis of contextual variables. Although the amount of personnel time involved in the creation of the variables and in analysing the data would be perhaps three months, the amount of elapsed time necessary made the presentation impossible. Because of the need to use a statistical package (SPSS) and the amount of data, the Kenya Government's IBM 370 had to be used. Unfortunately, the turnaround time on this machine is very erratic, especially during periods when the monthly government payroll is being run and when data for the major Central Bureau of Statistics' publication, *The Economic Survey*, are needed.

Initial considerations

The rationale for the choice of variables to include in

an analysis needs to be described briefly. Basically, the question was whether socio-economic variables affect fertility. In particular, it was hypothesized that higher levels of economic development would produce lower levels of fertility. In addition, if the characteristics of the households where women have lower levels of fertility are shown to be different from those women with higher levels of fertility, then the government's family planning programme could receive some direction on where to target resources.

Throughout the selection process four major dimensions were considered to define the household level of socio-economic development. These were wealth, education, social status and health. To determine the wealth of a household, further divisions were necessary. Although wealth in traditional rural Kenya was determined by land and cattle ownership, the advent of a modern society has added monetary income from other sources as another important determinant. In addition to the amount of land owned, the large degree of variability in the quality of the land needs to be taken into account. Therefore, in order to ascertain the traditional amount of wealth, the use of the land owned was also investigated. Crop production was considered separately from cash crop production. In total, four factors were used to determine wealth: land use for food crops, land use for cash crops, livestock ownership and monetary income or assets.

Education was also subdivided. Both formal and non-formal education characteristics were considered. Non-formal education was thought to be essential since primary education only became mandatory in the middle 1970s.

To define simply and validly social status is difficult because it encompasses many dimensions. Basically any social characteristic was considered if it was thought to affect fertility. In addition, variables that might indicate the level of social rank in the community, beyond the concept of pure wealth, were investigated.

Within the dimensions of health, there are both direct and indirect measures. Direct measures include an estimation of the actual level of health of the individuals in the household, whereas the indirect measures refer to the sanitary environment of the household.

All four dimensions are also important in defining the environment in which the individual women live. The level chosen to define the environment was the cluster. The provinces within Kenya are too large and diverse for aggregation at this level to be of practical value. Since districts are also quite diverse, especially in certain areas of Kenya, and there is no statistical assurance of estimates at this level, the idea of

aggregating to this level was discarded. The cluster, however, could be considered to give an indication of the local environment. When there were not enough households within a cluster to warrant a summary statistic being calculated, two clusters were combined. Since the sampling procedure selected two clusters from each sampling unit, clusters could be paired in this way when necessary.

These four dimensions (wealth, education, social status and health) are believed to define the degree of economic development at the cluster level too. The hypothesis is that the fertility behaviour of individual women is partly determined by the level of development of the communities in which they live. The remaining focus of this report will therefore be to discuss the practical and sometimes theoretical steps necessary to quantify these characteristics. Relevant household-level variables sometimes must be created first and then the individual or household-level variables must be further reduced to describe, in general terms, the type of community characteristic desired.

16.4 VARIABLE CREATION

Subfile production

Creation of subfiles containing the variables considered reliable and of possible interest is a necessary first step. All of the surveys mentioned except the Nutrition Survey II and the National Demographic Survey 1977 were on multi-survey data files, which included many different types of variable-length records. The cyclic information added unnecessarily to the quantity of data of process. In addition, the most convenient tabulation package at the Central Bureau of Statistics (SPSS) demanded a fixed format for each unit analysed.

From the IRS IV series, household information was obtained and retained utilizing a 'skeleton' program. The skeleton program assured that the file would be read correctly and that the output could be at household (or person) level. The program was modified slightly for use with the IRS III agricultural data. This was relatively easy primarily because the data collected and the format of the core questionnaires (not the modules) was almost identical for the two years. Since no-one had created such a basic program for the Labour Force Survey file, one was adapted from the format of the IRS IV program. For the National Demographic Survey 1977 and the Nutrition Survey II, new programs had to be written from scratch. However, these surveys are not complex in structure and the programs were not difficult. In total,

five separate subfiles were created using five unique programs.

This step is the only one that requires a comprehensive knowledge of Cobol programming. Because of the operating system installed, Fortran cannot be used to read blocked data. Since the data files are complex and long, it did not make sense to de-block them. SPSS (or a similar statistical package) can be used for all tabulation and for the creation of files of aggregated data. An SPSS option allows for the creation of a file where each aggregate record is repeated: the number of repetitions is equal to the number of women in each cluster. Then SPSS can again be used to merge the individual women data with the aggregated cluster data. (Since SPSS, in this case, could not cater for many variables on one record — the education of each adult woman in the household was retained — when creating aggregated variables, summarized estimates were obtained for each 'position'. That is, for the first woman reported in each household the aggregated items were calculated and for the second woman, etc up to the maximum number of women allowed. Later, these values would need to be combined for the final analysis.)

In the following paragraphs, possible variables are discussed in the context of the dimension they would hopefully represent. Because this stage of the work is not yet completed, some of the discussion is conjecture. The discussion indicates, however, the intended direction of the project and it indicates the large amount of work involved: (eg many computer runs are sometimes necessary in order to achieve the variable concept desired).

Household-level variables

Initial frequencies were run on all variables. At this point, many variables retained could be dropped from the investigation. In most cases this was due to the fact that the characteristic was not prevalent enough or too prevalent. For example, almost no households reported any modern farm equipment and almost every household reported growing maize. However, there were some instances where the frequencies indicated that the variables had not been reported properly or that the non-response was too high for inclusion.

Wealth

General livestock ownership was considered to be too general and did not differentiate sufficiently. Instead, the number of improved and unimproved cattle was used, since cattle are considered to be the livestock most desired in rural areas.

The amount of cash crops produced was totalled over the 13 cycles for the IRS III. The unit used for reporting all crops was the kilogram, so no conversions were necessary during the calculation. Although the cash equivalent would have been more appropriate to study, this variable was frequently not reported. And the prices varied too much for accurate automatic calculations to have been done; for example, the price paid for coffee beans varies according to the tested quality of the beans. Food crop production was also calculated by summing the amount harvested over the 13 cycles period.

The best indicator for the availability of outside income was considered to be the monthly income reported at the baseline of the IRS III. This variable was felt to reflect consistent cash flow into the household and did not include the sporadic selling of produce or handicrafts. Labour Force Survey data was not used here because it did not have the amount of income reported and the occupational categories were given in major groupings only.

Education

The variables relating to the amount of formal education were taken from the National Demographic Survey 1977 since this was a complete enumeration.

To obtain community estimates of the level of adult male and female education, it was felt that all residents must be considered equally. Therefore, the educational attainment of each adult in each household was retained for future calculations.

One variable considered to represent non-formal education was the number of households visited in 1977 and 1978 by government extension officials. The variable could also reflect a certain 'non-isolation' and this must be considered during data interpretation. Other forms of non-formal education (short courses and demonstrations) were only recorded for the person responding. A small proportion attend such courses, and they are not representative of the overall household level of participation.

In addition, the ownership of a radio in the household was retained. Radio programmes in Kenya are not primarily for recreation but are used as a means of informing and educating the public. The ownership of a radio, however, only implies access to this information. In addition, possessing a radio in a household could be a status symbol, and so this variable must also be considered in this context.

Social characteristics

The first possible variable relates to the attitude of the household toward formal education. In order to

investigate this, two items were compared from the National Demographic Survey 1977 at the household level. The first was the total number of resident children of primary school age (ages 6-14 years) and the second was the number of such children attending school. The number of children attending school and also working 'regularly' was reported in the Division of Labour module. However, almost all such children were reported as not 'regularly' performing work, so this was dropped. In addition, there did not appear to be any difference between female and male children in this respect.

The Labour Force Survey collected data on the typical type of employment of each adult resident. Because no information was reported on income, these observations cannot be used to indicate the level of monetary income. However, it is possible that clusters with many residents and households involved in the salaried economy are different from those without such involvement. Therefore, the number of residents in each household so employed was retained.

Health

The nutritional status of each child is obviously an important indication of the health level of the entire community. The Nutrition II Survey reported the type of sewage disposal used in the household. To investigate this by type was not feasible since there were too few households with anything more advanced than a pit latrine. The number of households with piped water (either communal or individual) was also too small to warrant further study. It was felt, anyway, that the quality of the water supply was the important characteristic to ascertain and this was not possible. Therefore, the only variable retained was the nutritional index (for stunting) for each child measured.

Theoretical points for contextual variables

The format of the contextual variables demands considerable thought. As a general rule one would want to retain not only a measure of the central tendency but also a measure of the variability. Moreover, in previous analyses of fertility on an individual level in Kenya, it has been discovered that the relationship between fertility and socio-economic data is not linear.

To study non-linear relationships, the variables have been grouped and decomposed into a number of binary variables. For education, this has resulted in one variable indicating some primary education and another indicating at least completion of a primary education. The average educational level of all adult

males in a community could be meaningless, whereas the per cent of males with only some primary education and the per cent with at least completed primary could be closely related with individual fertility norms. The analyses presented in part I of this volume have hopefully shed more light on the problem of how to construct the proper variables.

Practical procedures for contextual variables

It remains only to discuss the process by which the final data file can be created. In the first step, five subfiles were created by individual Cobol programs. Each one of these files was then accessible by SPSS for frequency and tabulation production. A thorough analysis of the possible contextual variables at this stage is necessary in order to create meaningful and reliable data. For example, one can calculate community variables based on averages, ratios or percentages with certain characteristics. And these averages, ratios and percentages can be created using individuals or households as the basic unit. In many cases, a combination of methods is demanded in order to fully define the environmental factor under discussion. Furthermore, some investigations may show inter-relationships among variables both on a theoretical and practical level, and therefore a combination of some variables into one conceptual framework is necessary.

In this example, educational attainment of the resident male and female adults and the nutritional (stunting) index for each recorded child were retained on the relevant subfile. An estimate of the average value and of the extreme could be obtained for each of these variables using SPSS, given that a pre-determined maximum number of eligible persons was catered for in each household record. (One assumes that the SPSS procedure. Aggregate does work properly on most versions. However, the output of aggregated files has not been possible in Kenya due to an error in the program.) To estimate the prevalence of the 'extreme' the percentage of all persons below a certain cut-off (for education, none and for nutritional status, those considered stunted) was calculated. This was felt to indicate the extent to which the individuals in the community were affected by (in these cases) illiteracy and malnutrition. The ratio of eligible children in school was also calculated by totalling all the individual child characteristics and not by averaging any household ratios.

Estimation of the community variable by calculation of the per cent of the households with a certain characteristic was used for visits by government

officers, the presence of radios and salaried residents and total household income. Total income could not be accumulated over households since it was in categorical form when collected and therefore had to be considered at the cluster level as the per cent of households in each category of income. The presence or absence of a radio was only given at the household level and therefore the only possible community-level format was a percentage over households. Very few households had more than one visit by government officials and it was felt that the initial contact was the most important, so the percentage based on a dichotomous household value also seemed the best alternative. To estimate the reliance on salaried income, the household was again used as the basis because it was felt that the estimate would be a more stable indicator over time. Therefore, the percentage represents the proportion of households having any resident employed for a salary.

Average values of the number of cattle, amount of cash crops and food production were calculated as well as measures of the variation. These three variables, however, in total appear to define the land use; for example, certain areas grow cash crops and do not own livestock and vice-versa. An investigation of the relationship among these variables over clusters resulted in determining patterns of land use. It was expected that a series of binary variables (and interactions) would be developed for analysis based on the groupings of clusters formed.

Once the algorithm for each variable on a specific file is established, SPSS can be used to create cluster-level files. A good working knowledge of both SPSS and the data is necessary. The last stage in the file creation utilizes SPSS's merging procedure. The Kenya Fertility Survey (or a subset of the data) can be combined with each aggregated file output from the last step. This must be done five times because only one aggregated file can be added to the master file during a computer run of SPSS. The final file, containing Kenya Fertility Survey data and aggregated socio-economic data from other data sources, is ready: now the statistical analysis can begin.

16.5 CONCLUDING COMMENTS

In the Kenyan situation, the mass of data collected has been primarily a liability. Because of the wide variety of surveys conducted, no concise and specific community-level survey was attempted. Therefore, only contextual, and not global, variables can be considered. There is also no known set of socio-economic variables to investigate further since few in-depth

studies on the data have been completed. Cyclic collection of data has added to the complexity of the process of variable creation, making it necessary for the researcher to first aggregate at the household level in most cases.

On a theoretical basis, the process of creating community-level data involves much more time than anticipated. If a community-level survey has been conducted, many of the decisions necessary would have been thought about, planned for, and hopefully solved before the start of analysis. In addition, there are two stages of variable creation to consider, the household and the cluster level. However, the development of the conceptual dimensions of the variables to study should not be different from other countries where community-level surveys were conducted. The investigator should not be limited by the set of variables during this stage. How well the variables available fit the theory is, however, another matter. Here again, Kenya is at a disadvantage because the variables were not collected with this type of analysis in mind. Finally, the problems of the representativeness of the contextual variables in terms of the sample design is troubling.

The programming involved in the creation is extensive when compared to other countries with limited or community-level data. Two additional steps (the creation of the household files and the aggregated files) are necessary for each original file of data. Knowledge of Cobol and SPSS are required and the time involved both for the computer and the programmer is problematic. The analysis of community-level data with individual data is a major undertaking in the Kenyan situation.

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APPENDIX A LISTING OF THE SURVEYS CONDUCTED IN NISSP

Integrated Rural Surveys

IRS I (1974-5)
IRS II (1976-7)
IRS III (1977-8)
IRS IV (1978-9)

Single-Visit Modules

Household Amenities (IRS II)
Shopping Habits (IRS II)
Literacy (IRS II)
Nutrition I (IRS II)
Rural Non-Farm Activities (IRS II)
Handicapped People (IRS III)
Non-Farm Activities (IRS III)
Non-Formal Education (IRS IV)
Nutrition II (IRS IV)
Division of Labour (IRS IV)
Energy (IRS IV)

Cyclic Modules

Health (IRS II)
Sales of Agricultural Produce (IRS II and III)
Food Purchases (IRS II and IV)
Labour Force Survey (IRS III)

Crop Forecast Surveys

Long Rains 1976
Short Rains 1976
Long Rains 1977
Short Rains 1978
Long Rains 1978

Market Information Surveys

Market Structure
Source and Cost of Market In-flows (1977)
Market Prices at Retail Level (1977)
Market Prices at Retail Level (1978)
Source and Cost of Market In-flows (1978)

Intermediate Size Farm Survey (1978)

Rural Roads Evaluation Study (1979)

Urban Food Purchasing Survey (1977)

National Demographic Surveys

NDS I (1977)
NDS II (1978)

Kenya Fertility Survey (1977-8)

17 Collecting WFS Community Data: The Pakistan Experience

M. Nizamuddin

17.1 INTRODUCTION

The main purpose of this paper is to review the strengths and weaknesses of the WFS approach to collecting data on community-level factors which are hypothesized to affect fertility. The discussion draws heavily upon Pakistan's experience in the collection and analysis of community-level data. The following section of the paper discusses the rationale for collecting community-level data. The third section (17.3) briefly summarizes the major findings emerging from the analyses of WFS community-level data from selected countries, and problems associated with the conceptual and analytical methods utilized. Section 17.4 of the paper discusses selected issues concerning community-level data: problems of defining a 'community', of designating the respondents for the community survey, and other aspects of data collection. The fifth section (17.5) describes the circumstances under which the community-level questionnaire was incorporated in the Pakistan survey: problems associated with the contents of the WFS community-level questionnaire, the field implementation, and the subsequent processing and linking of the data with the individual data. The final section (17.6) of the paper presents some concluding remarks.

17.2 RATIONALE FOR COLLECTING COMMUNITY-LEVEL DATA

The focus of this seminar on the collection and analysis of community data is very appropriate at this point in time. In recent years, social scientists in general, and demographers in particular, have shown a growing interest in the study of human fertility and mortality from both individual and contextual perspectives. The latter focuses on supra-individual dimensions, referred to in the literature as structural, contextual, ecological, environmental, community-level characteristics and

variables. Ecological factors in demographic research were first used in mortality studies, where it was recognized that environmental conditions were far more important than the individual characteristics in affecting the levels of mortality (Freedman 1975; McKeown 1965; Ohlin 1961).

The contextual, or structural, perspective has also been applied in fertility research. The earliest studies of relevance are by Duncan (1964), Srikantan (1967), Hermalin (1968), Rhodes (1971), and Anker (1973). Most of these studies did not draw on special data collected at the community or areal level, instead using individual data aggregated across each community or areal unit of analysis. More recently, Freedman (1974a), McNicoll (1975), Berelson (1976) and Hermalin and Mason (1980) have pointed out the value of using community-level data in conjunction with individual-level data in fertility research and as a basis for formulating effective population policies and designing programmes.

The potential value of community-level data was recognized by the WFS in the early stages of the survey programme. The WFS published and circulated to all the participating countries two basic documents (Freedman (1974a, b)) which contained the rationale for collecting community-level data. Seventeen out of the 42 participating countries have incorporated a community-level questionnaire in the WFS survey (Chidambaram 1981). An assessment of the contents of the community-level questionnaire used by the participating countries was recently undertaken by Casterline (1981). This assessment suggested that:

'Most of the surveys have followed the suggestions of Freedman, emphasizing measures of the relative accessibility to the community of facilities such as health clinics, family planning clinics, schools and financial institutions, and measures of presence in the community of sanitation and water services, sources of electric power, and swift and easy communication with the outside world. Items on the nature of economic

activity have also been included in some of the questionnaires. In most countries, the community survey has been limited to rural areas.'

17.3 FINDINGS FROM ANALYSES OF COMMUNITY DATA

The papers by Casterline and Tsui in this volume (chapters 4 and 5) review the findings to date from analyses of WFS community data. These have generated considerable disappointment and criticism in the demographic community (Miró 1981 and Demeny 1980). Given the limited and exploratory nature of these analyses and the fact that most of the WFS community surveys thus far analysed seemed to have ignored the general guidelines for data collection and analysis set forth by Freedman (1974a), this disappointment and criticism seems rather premature.

In studies utilizing community-level variables, these variables on the whole demonstrate weaker relationships than the individual-level variables. This finding raises several questions about the validity of the theory and methodology followed in the collection and analysis of WFS community data. Are we justified in concluding that indeed community-level variables have no significant relationship with the individual fertility-related behaviour? Or, is this lack of a stronger relationship due to certain problems associated with the collection, compilation and measurement of our community-level variables? We are inclined to respond affirmatively to both of these questions. It is possible that we did not specify correctly the theoretical relationships. It could also be that our sociological theory of contextual/structural effects does not fit the actual conditions of a developing society such as Pakistan. Or it may be that we are not capturing the requisite 'intermediate link' which could mediate the influence of community factors on individual behaviour.

There are several possible intermediate links. One is the community's normative structure, which presumably varies between communities, especially on such matters as family size preferences and contraceptive use. Most of the WFS community surveys excluded questions on community norms and attitudes originally proposed by Freedman (1974a), due to presumed problems of data reliability.

In addition, most of the analyses thus far completed on the WFS community data suffer from certain measurement problems. In some countries, community variables indicate merely presence or absence in the community of facilities or services, supplemented

with a measurement of distance for those absent from the community. Not taken into account is the adequacy or inadequacy of a facility for the village and the proportion of the villagers who have access to it.

Another problem is that the WFS surveys collected only cross-sectional, and not longitudinal, information on community variables (as well as individual variables). This prevents testing of the causal ordering among variables measured at the various levels. It is impossible to know when institutions and programmes become available during the individual's life cycle.

Finally, some of the analyses of WFS community data have attempted to measure the direct effects of community variables on the fertility of individuals. It is quite possible that community characteristics affect fertility indirectly through influencing the intermediate variables.

Recently, Casterline (1981) has re-emphasized the importance of examining the nature and mechanisms of community effects on individual behaviour. Four mechanisms for community effects have been identified. These include:

- 1 direct effects of social norms;
- 2 direct effects of structural factors on individual incentives;
- 3 indirect effects through the determination of individual attributes and resources; and
- 4 effects through the provision of resources for acting on the intermediate variables.

The need for examining separately the intermediate variables, particularly nuptiality, breastfeeding, coital frequency, contraception and fertility preferences was also emphasized. In fact, the above classification of the mechanisms has been suggested as a general framework for the future analysis of community-level effects.

17.4 MAJOR ISSUES IN COLLECTING AND ANALYSING COMMUNITY-LEVEL DATA

The recent experience in designing and implementing WFS community-level questionnaires in conjunction with household surveys has uncovered numerous administrative and technical problems that need careful examination. Some of these problems emanate from the wide range of definitions used to describe community or any other small area designated as 'locality'.

Other problems emerge from the complexities and biases introduced due to the different types of respondents for the community questionnaires and aspects of the survey design, such as the size of the sampling clusters. We shall attempt to elaborate these further in the following discussion.

The conceptual and administrative definitions of community

In most community surveys, it is rather difficult to identify community in the strict sociological or ecological sense. It is generally assumed that communities have a well-defined geographical area and social organization. Often, a community is equivalent to the lowest level of local area of government. Examples of community could include the village, the small township, the city, the administrative district. For example, a village in Pakistan may be a self-contained identity having a fixed geographic area, or it may consist of an agglomeration of several small 'hamlets' attached to a 'mother village'. Generally, community-level questionnaires in the WFS surveys have been implemented for the 'mother villages' or the 'main villages'. The wide variations in the size of villages complicates the analysis of effects of the absence or presence of certain services in the community, distances to facilities, etc. Due to the problems of defining boundaries of communities, it is difficult to relate community characteristics to the entire population of the cluster or the designated 'locality'.

Common practice in the community-level data collection and analysis has been to focus on rural villages. This practice has obviously limited the analytic potential of community-level data. Studies based on the aggregated data from the urban areas demonstrated significant additional advantages in the interpretation of fertility behaviour (Hermalin 1968; Srikantan 1967). It is therefore strongly recommended that community-level data should be collected from the urban areas as well. The optimal strategy would be to develop two sets of questionnaires: one for the rural areas and small towns, and one for big cities. (At the analysis stage further decisions on the final levels of aggregation could be made.)

We need to modify our definition of the geographic locality for the purposes of community-level data collection. A recommendation with much in its favour is to use sampling clusters of more or less equal sizes as the unit for data collection and aggregation. However, if the intent is to supplement the community survey data with data from other sources, such as censuses and administrative records, then it is advisable to use a community definition compatible with these datasets.

Problems associated with the questionnaire design

The original intent of the WFS community module was to serve as a basic guide for gathering community data through interviewing community leaders and by compiling data from censuses, administrative records and other statistical sources. Most participating countries seem to have ignored the latter part of the proposed strategy. Consequently, the data gathered through interviews with community leaders suffer from many important gaps, in particular data on contextual variables, distributed aspects of community facilities, and actual utilization of social services. This has considerably weakened the potential utility of WFS community data.

Problems associated with measures created by aggregation

The likelihood of obtaining good estimators of the community characteristics by aggregation of household survey data is not very high. If the sample size per cluster is not large, then the aggregated community factors will be subject to substantial sampling error. On the other hand, if national census data are used for aggregation purposes, the problem of sampling error can be eliminated entirely. Even if the relevant data are not available from the census, other administrative sources should be explored as sources of community-level characteristics. In some circumstances special intensive community surveys pertaining to the same time period, as well as post-survey intensive interviews with the local officials from the specific communities, may be available to augment the community-level data.

Problems associated with selection of respondents for community questionnaires

In some countries the community survey used several respondents per community. This can be time consuming; in certain cases 3-4 days were required to complete the community-level questionnaire. The commonly expressed advantage of saving time through the administration of a community questionnaire needs to be explained in the light of WFS experience. The typical respondent to a community questionnaire has been a community leader and in a majority of cases has been an elderly male. It could be argued that responses to the community-level inquiry by an 'interested' respondent may not reflect the true community situation: as a leader, he may try to protect his leadership and slant his answers accordingly.

Obviously, the preferred respondents in a community survey would be impartial community leaders or local officials. Reporting error may be reduced by carefully designating one or two respondents from the community to provide the needed information. Through the help of this selected group of respondents, published or unpublished relevant records about the community situation may be located and all the available statistical sources utilized to the maximum. Then questions about community norms and attitudes and other relevant cultural practices might be addressed to community leaders. Greater reliance should be placed on available statistical materials, particularly for distributional aspects of community variables.

17.5 COLLECTING COMMUNITY-LEVEL DATA: THE PAKISTAN EXPERIENCE

The Pakistan Fertility Survey was negotiated in July 1974 and the main fieldwork was carried out during June-December 1975. The proposal to implement the WFS community-level questionnaire was made to Pakistan by the WFS just before the beginning of the preparatory fieldwork in February 1974. As a consequence, the usual rigour in the planning of the questionnaire content was not possible. In fact, the Pakistan community-level questionnaire was implemented without any definite plans for analysis. Many of the items suggested in Freedman's model questionnaire were deleted on the assumption that it was not possible to obtain reliable information on these items. In particular, questions pertaining to the distribution of community facilities and actual accessibility of these services to the community were excluded. Questions about the community's norms, attitudes and practices towards health and family planning matters were also omitted.

Consequently, the WFS community-level questionnaire was drastically reduced, both to ease the data collection and out of concern for the reliability of the data. The modified community questionnaire collected information on the following characteristics of each selected village within the rural sample: transportation and communication facilities, health and family planning facilities, educational facilities and accessibility to agricultural infrastructure facilities.

The community-level questionnaire was implemented in the rural sample only and no efforts were made during the analysis to calculate community-level measures for the urban sampling clusters by aggregation. The modified version of the community-level questionnaire was administered by the field supervisors

at the time of listing and mapping the selected villages. Typical respondents were village school teachers, retired military or civil personnel, the village headman or any other influential person in the village.

In cases where more than one village was included in the PSU, the characteristics of the main village were recorded. For example, if the PSU contained three small villages and one large main village, only one of which had a family planning clinic, then the village that had the family planning clinic was regarded as the study village. Out of a sample of 200 villages, fieldwork was completed in 193; data collection in the remaining 7 villages could not be carried out due to problems of inaccessibility.

17.6 MECHANICS OF COLLECTING COMMUNITY-LEVEL DATA

Several sources, other than the specially designated community-level instrument, have been identified by Freedman (1974a) for obtaining community-level measures. These include:

- 1 housing, population and agriculture censuses;
- 2 periodic household surveys;
- 3 administrative records, service statistics;
- 4 detailed anthropological studies; and
- 5 detailed locality maps.

In most developing countries many of the above-mentioned data sources are either not developed fully or not readily available at the level of the small geographic area, in particular the information most pertinent for the explanation of fertility. Under the circumstances, a 'mixed-source' strategy for collecting community-level data is most appropriate. For example, data for the contextual variables may be obtained from the housing and population censuses and other pertinent administrative records; information about the distributional characteristics, such as the extent of availability of health and family planning services and proportion of population covered by such programmes, from the periodic reports from the service outlets; distances and other related items from the published maps and other cartographic materials; and data for the remaining items should come from an especially designed community-level survey instrument.

17.7 CONCLUDING REMARKS

WFS community data has been criticized for being too

thin, for not giving full enough description of the community to be worthwhile (Miró 1981). She specifically notes omission of data on laws or customs governing inheritance, particularly of land; access to social services by different social groups in the community; mechanisms through which political decisions affecting the life of the community are taken; and characteristics of the labour market. Would it be feasible, in the context of a national fertility survey of the WFS design, to gather additional more detailed data about communities? In view of my experience in modifying and implementing the WFS community module in Pakistan, I would be tempted to answer this question negatively. However, it would be advisable to defer any answer to this question until we have analysed more of the WFS community data, as this will provide more details and a sounder basis for answering the question. I recommend a comparative analysis of the WFS community data, to examine the variations introduced in the module and the implications for analysis.

The WFS community survey was to be implemented by the field supervisors during the normal course of fieldwork in the sampled communities. Thus, both the instrument and the mechanism of data collection were not designed for obtaining any detailed information on the items identified by Miró (1981). I do not question the relevance of these items, rather the feasibility of collecting such data in the context of a household sample survey of the WFS design.

In my opinion, the weakest aspect of the WFS experience with community data has been organization and implementation. A strong push from WFS headquarters was lacking; instead, the decision to collect these data and the design of the community survey was left almost entirely to the national survey director. There was no definitive programme with respect to the training of staff, the mechanics of collection, linking and analysis of community and individual-level data, in contrast to the guidance provided for household and individual data. As a result, many countries implemented a modified version of the WFS community module, at least during the first phase of the WFS programme (1974-8), without much guidance and assistance from the WFS headquarters. This apparent lack of systematic support from the WFS headquarters, coupled with lack of experience in survey taking in many of the participating countries, resulted in 'casual' implementation of the community-level questionnaire.

In this paper the discussion has been focused on the problems of collecting and analysing WFS community-level data. The WFS community-level data come from different countries with varying levels of development and political structures. The use of

community-level data in the study of fertility-related behaviour is of recent origin. There are many issues, both in the theory and methodology of analysis, that need critical assessment. The WFS community data are probably the best source available for testing and sharpening our theoretical and methodological skills. If carried out properly under the supervision and guidance of competent researchers, the analysis of WFS community data can go a long way in increasing our understanding of the socio-cultural processes that determine levels of fertility.

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18 Collecting Community Data: Discussion

W. Brass

18.1 PRELIMINARY POINTS

The four papers for the session serve as the matrix for these comments but general points made throughout the Seminar were also absorbed and may have relevance to what is discussed here. Although the papers are all relevant and, indeed, central to the main issues they show little overlap and are nicely contrasted. They are also written with great conviction. This is because they are in a sense fragments of autobiography. The authors describe and interpret their own experiences rather than attempt to review common findings. A powerful aura of dissatisfaction emanates from their accounts. Much of them are concerned with failures to make or assemble the observations required to achieve the objectives. The reasons for the failures are effectively described. Improvements in field techniques, tried or recommended, are noted but little evidence is provided that the new methods would be successful. This is hardly surprising since the pertinent evidence would come from case studies of community data collection and analyses which added appreciably to the understanding of fertility determinants or, at least, differentials. Such studies are lacking.

My own experience has been equally frustrating and I can, therefore, neither disagree with the emphasis on difficulties or gauge the value of solutions. It may be useful, however, to try to define where the fundamental problems lie; thus making possible an assessment of whether they can be overcome. It will be assumed that the topic is the systematic recording of observations which may be analysed for relationships between the fertility of women and the characteristics of the community in which they function. The decisions on the data to collect, the ideas to be investigated and the methods of analysis may be based on intensive inspection of the community behaviour by an individual but the codification is in terms of quantitative labels.

In order that the study can be undertaken there

must be a classification of communities and specification of the membership for each woman, or, more generally, family. But it is clear that 'community' is a convenient concept for noting that an individual exists in a physical and social environment. Each person belongs to many communities over a range of aggregations in one sense or has varying interactions with aspects of one community in another. In simple societies it may be that for practical purposes the influences can be adequately summarized by one well-defined unit such as a village or hamlet but such conditions are of little interest in the present context. The 'most meaningful' classification has to be determined in some way. In practice, boundaries, pre-set administratively for reasons of politics and convenience, often dominate the choice. Of course, other disciplines have the same impediment. The categories of cause of death are a good example. Note the immense amount of sustained and continuous effort which has been devoted to this analogous issue.

The approach which tends to be suggested as a solution to the problem (in the papers here also) is a preliminary investigation to establish the optimum choice of community boundaries in terms of transport and communications, social networks and so on. There is an implication here, however, of existence and uniqueness, and a faith in *a priori* judgement which are not well supported by experience. The best classification for one set of inter-relations may not be so for another and some verification is surely required. Although, if choices must be made, it is better that they be based on some knowledge of community behaviour rather than the arbitrariness of administrative arrangements it is doubtful if the returns will be impressive. Because of the difficulties of the judgements it is worth considering whether the issue can be avoided by re-defining characteristics as household or individual rather than community, for example 'Distance to nearest clinic' rather than 'Is there a clinic in the village?', and 'What markets are visited?' rather than 'Does the community have a market?' In prin-

ciple, it would then be possible in the analysis to examine how the strength of distance effects varies with possible definitions of communities. The practical problems are considerable but the 'open-ended' question has a logical clarity which makes it attractive. In these cases the interactions of individual and community may be postulated to have a spatial dimension which is coterminous with the community effects. For other characteristics this is not true. Thus there may be a critical mass of persons living in sufficiently close proximity necessary for the development of particular behaviour. The interaction of individual and community does not then depend on distance alone. Nevertheless it may be possible to work with indices of population potential (functions of numbers of persons located at different distances) to capture community characteristics without the specification of limits.

These preliminary points draw attention to the diversity of characteristics covered by the phrase 'community variable'. Indeed all the papers in this session assume that the meaning is sufficiently clear. Yet by implication the measurements at the forefront of their interest vary greatly. Perhaps it is sensible to preserve the description for a broad class but if so it becomes necessary to subdivide operationally. The distinctions are useful for the consideration of data collection. The divisions made here are for convenience in discussion and are not based on any deep conceptual framework.

One important dimension may be approximated by a dichotomy of 'common' against 'collaborative', that is features which are shared as against those that demand interactions among individuals. Another describes the ways in which the variables are specified as 'unitary', 'aggregate', or 'typical'. Cross-classifying these two dimensions gives a set of categories which help in the interpretation of data collection problems.

18.2 CATEGORIES OF COMMUNITY DATA

Unitary common

These features are the simplest and probably the most extensively studied in relation to fertility and mortality. They include schools, clinics, water supplies, public transport, that is, services for many persons in a neighbourhood but not necessarily a community expression (in some instances they may be). Chayovan and Knodel (chapter 15) are much concerned with such factors. They point out that they are not as easy to measure as they seem, partly because of the individual's association with more than one community. These variables are important as expressions of service availability (education, family planning,

maternal and child health) and accessibility to outside influences. Adequate relations to unique communities may only be definable under rather simple conditions, however, and the 'distance' methods are likely to be preferable.

Aggregate common

Here the measures are obtained by summing over a group of individuals or households to give, for example, proportions of adults with secondary education, average numbers of sheep or goats per family, proportions of households possessing a radio. Obviously the group serving as the community has to be defined beforehand with all the problems discussed in the papers. There is a distinct possibility, however, that the decisions may not be critical for variables of this kind. As boundaries enlarge the measures will generally change rather slowly unlike the sharp discontinuities for presence/absence variables. It should be noted that, often, with a constructed variable of this kind the groupings for aggregation can be decided after experiment with different alternatives.

Typical common

This is the information collected from discussions with knowledgeable residents (headman etc), questionnaires about 'usual practice', or sometimes from a sample which does not relate exactly to the community under study. The measures may be constructed from censuses or other surveys (of nutrition, the environment and so on). Werner (chapter 16) examines some of the severe operational difficulties of deriving sensible, relevant indices in these circumstances. Examples of characteristics often handled in this way are diet, treatment of sick children, carriage of water and other household activities. Such studies are often heavy and few have proved rewarding. In times of social change (and these are the conditions of pre-eminent interest), 'typical' may be the behaviour of the past, and divergences from the norm are the most significant features. The evidence suggests that community effects operate in subtle, probably diverse and complicated ways. 'Typicality' is not a fine enough instrument. The investigations may stimulate hypotheses and suggest conditionalities but it is doubtful if more should be expected.

Unitary collaborative

This category comprises agencies or organizations which have a coherent identity but require substantial collaboration for their establishment or administration. Co-operative marketing, provision of irri-

gation, village councils, women's meetings may be in this category. On the other hand they may operate largely through external management and demand little collaboration. It seems doubtful whether a simple awareness of the existence of bodies in this category is of much value without a fairly detailed knowledge of their functions in the community and relation to individuals in it. This assessment leads towards the conclusion that continuous, participant observation will be necessary whether or not it is followed by the collection of survey-type data.

Aggregate collaborative

This category is dominated by the 'collaborative' rather than the 'aggregate' and is thus similar in implications to the one above. It covers these activities, such as the care of children and old persons without immediate family or the mobilization of labour at peak agricultural periods which demand group participation but can not be located in a specific agency. Summation over individuals and households is impracticable and probably irrelevant. Existence is not meaningful without a delineation (almost certainly in some detail) of how the system works.

Typical collaborative

This heading is included for completeness. 'Normal' or 'usual' behaviour in the circumstances of the previous section, for example the treatment of the old, can of course be elicited from informants or, perhaps, the writings of anthropologists. The criticisms of the 'typical common' apply here with even greater force.

18.3 CONCLUSIONS

Considering the categories of community data in relation to demographic determinants (particularly fertility), the conclusion emerges that the systematic recording of items of information is most promising for 'aggregate common' variables. A large number of social and economic features for individuals and households can be summed to give sensible community indices which are not too sensitive to boundary specification. This does not imply that the characteristics to be used are obvious, although some such as education and outside associations may be. It is, unfortunately, true that the most significant, simple indicators of response to changing conditions will often be specific to

conditions of a place and time. The most effective study may, therefore, be local rather than regional or national. The preliminary investigation to develop the best instruments for measurement may need substantial resources.

It does not necessarily follow that the aggregation should be over responses to objective items. A summing of attitudes may give good differentiating indices although the problems of interpretation can be formidable. For example, the analysis of data from the WFS Mexican survey showed larger differences in fertility by size of urban area of residence as reported for childhood than for the current. But the apparent changes from the reports for childhood on urban residence (subjective) to the current specification were impossible, leading to the conclusion that the reports of childhood residence were in error as objective measures. Thus the perception of urbanization was a superior differentiator to the objective measurement.

The paper by Cain (chapter 14) is concerned with the factors called 'collaborative' above, particularly the 'aggregate collaborative'. He demonstrates with detailed examples the necessity for intensive local study to discover how such systems work. This requires long, patient observation. His arguments are convincing. But the research strategy demands large resources to establish results which are probably only valid in limited geographic and cultural conditions. The time and effort it will take to accumulate enough evidence for confident generalization are daunting. It is to be hoped that intuitive leaps from the intensive observation to the extensive, summary survey are possible but as yet even the existence of the right pathways is undetermined.

The Seminar has reinforced the view that the usual way to undertake the collection of community data is to add a few questions for answer by 'knowledgeable persons' at the end of a carefully researched and piloted household and individual questionnaire. I carried out a survey of this kind 35 years ago and am not ashamed of it. However, I am rather ashamed of recent, similar exercises. Alternatively, rather desperate efforts are made to extract relevant measures from varied studies with different objectives. If we believe community factors are important, before substantive surveys are undertaken we have to put much larger resources into feasibility and pilot studies, in order to map the geographical variations in the dependent variables and possible linked factors, to determine how interactions actually operate, and to experiment with alternative measurement instruments.

Part V

Instruments for Collecting Community Data

19 Collecting Community-Level Data for Fertility Analysis

Richard E. Bilborrow

The purposes of this paper are threefold: (1) to indicate briefly why it is important to collect – and analyse – community-level data for fertility analyses; (2) to discuss some of the methodological issues involved in community-level data collection; and (3) to consider the desirable content of community-level data collection instruments for fertility analyses, which will include a comparison of the WFS (Freedman 1974) and POPLAB prototype community schedules. While the present discussion of all three of these topics is open to debate because of our extremely limited experience, I am inclined to think of community-level data as of potentially transcendent importance, for reasons to be indicated in section 19.1 below.

19.1 WHY COLLECT COMMUNITY-LEVEL INFORMATION FOR FERTILITY ANALYSIS?

Data collection by means of household sample surveys has become increasingly common around the world. It is now recognized that analyses of relationships between social and economic variables based upon only aggregate information are not sufficient to formulate public policies. First, many macro variables are highly inter-correlated and the direction of causation therefore ambiguous. Secondly, much recent social and economic theory is about the behaviour of individuals and households. These inferences from aggregate data alone may be subject to the well-known ‘ecological (or group) fallacy’.

Moreover, great advances have occurred in techniques for designing, implementing and empirically analysing data from household surveys. As a result, a great number of surveys have been conducted to collect data to analyse the determinants and consequences of individuals’ and household behaviour.

But the focus on strictly micro-level data collection and analysis has become exaggerated. Not only sociologists, but also some economists, recognize that individual behaviour is influenced by its social context or environment. Therefore statistical investigations of, say, the determinants of fertility which ignore this context may well yield biased coefficients for the individual variables, and larger effects than would be the case otherwise. A multi-level analysis can, at least in principle, alleviate these biases. A simple example of a model of the determinants of fertility which incorporates both individual/household-level and community variables is illustrated diagrammatically in Model 1 (figure 19.1). Model 1 illustrates the potential direct (path A) and indirect (path BC) effects of ‘community’ variables, or of the relevant environment, on individual behaviour, which here is assumed to be the individual woman’s fertility. Specific hypotheses about the effect of community factors on fertility, migration (see Hugo, chapter 10) and contraceptive use are found elsewhere in this volume, though whether the effects are direct or indirect is usually not made clear. Further consideration of these issues is beyond the scope of this paper.

Model 1 is presumably the type of model existing multi-level analyses have in mind (see Tsui, chapter 5, and, for migration, Findley 1981). Only weak evidence

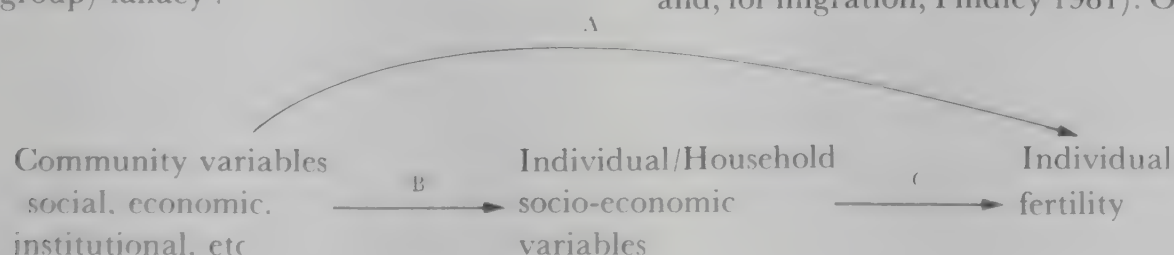
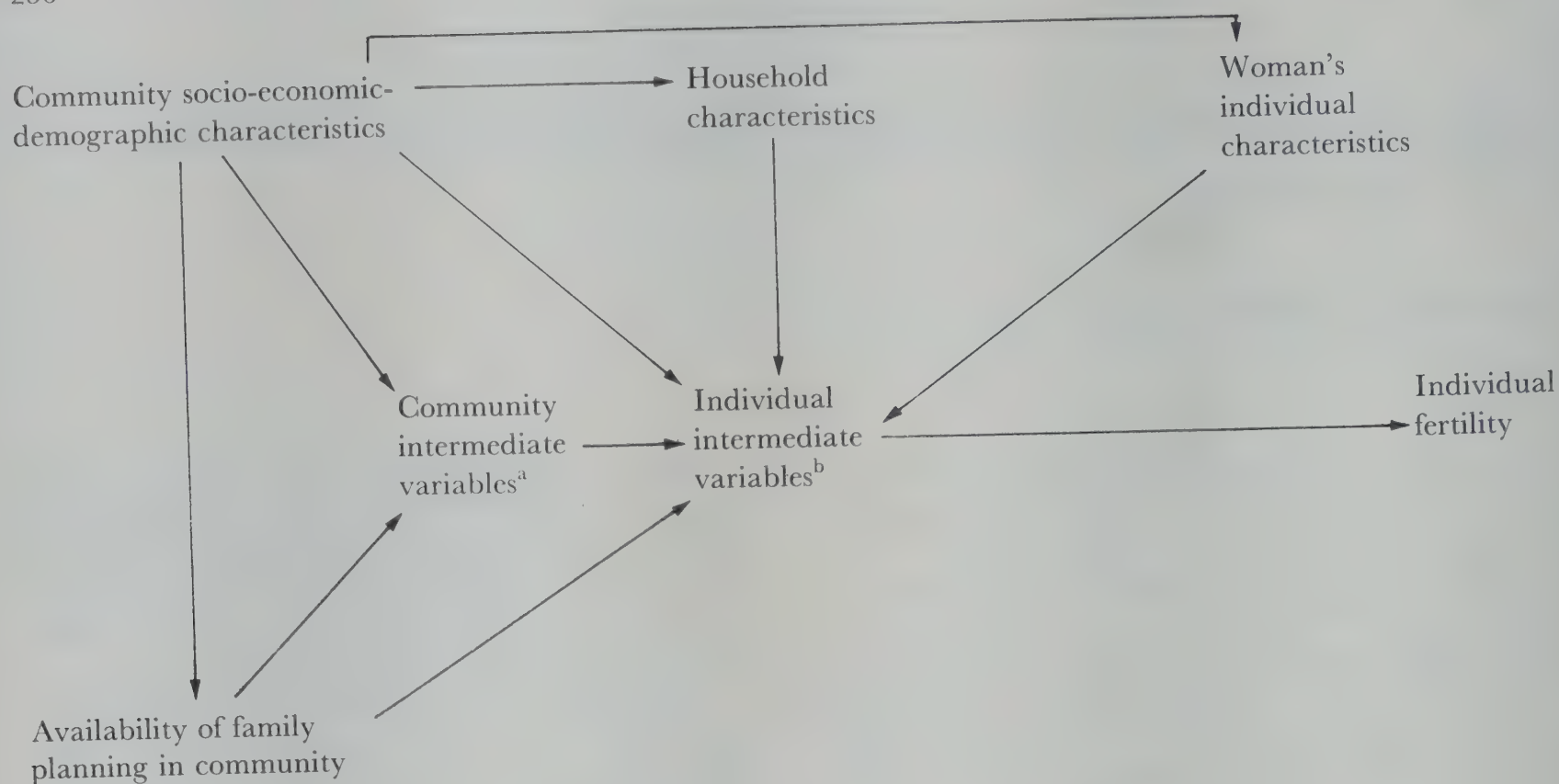


Figure 19.1 Model 1: the simplest general model of fertility determinants with community variables



^aCommunity norms and practices regarding use of family planning methods, abortion, and breastfeeding, and nuptiality/exposure factors.

^bUse of family planning and abortion, breastfeeding, nuptiality and presence of husband (exposure), coital frequency.

Figure 19.2 Model 2: An intermediate-variables model of fertility with community variables

supporting community-level effects on fertility has been observed, though most of this non-evidence refers to the use of contraceptives as the dependent variable and there are exceptions (eg Herrin and Te 1982). There may also be more evidence for community-level effects on a related (intermediate) variable, breastfeeding (see Popkin *et al* forthcoming). An elaboration of Model 1 focusing upon intermediate variables is illustrated as Model 2 (figure 19.2).

But beyond the general question of whether relationships have been observed between existing community variables and individual fertility (or its antecedent intermediate variables), there are three important reasons for collecting community-level data for fertility analyses: (1) they provide the key exogenous parameters needed to estimate satisfactorily an economic model of fertility; (2) they provide government policy parameters, or something close to them; and (3) they are relatively inexpensive to collect. A consideration of these points follows:

- 1 The so-called 'economic model of fertility' (whether of the 'new home economics' or an Easterlin expanded version) sees fertility decisions as inter-related with a number of other household decisions,

for example, with the work and education decisions of all household members. While the rationale for this has been extensively documented, the vast bulk of the recent econometric literature continues to use 'reduced form' single-equation statistical approaches (see Molyneaux and Bilsborrow 1983). By including endogenous variables on the right-hand side of the equation, these studies yield coefficients which suffer from simultaneous equations bias. As one of many examples, studies which regress woman's fertility on her employment status do not recognize that her employment is inter-related with a number of other household decisions (such as her children's work, which is related to the perceived value of children and hence fertility).

An illustration of a model which recognizes some of the major elements of endogeneity is provided in Model 3 (figure 19.3). Note the arrows on the right-hand side of the figure. While the estimation of recent fertility, or the length of a birth interval, may permit some justifiable simplification in the model structure, the point is clear: the exogenous community factors are crucial in estimating fertility. The woman's own use of contraception is

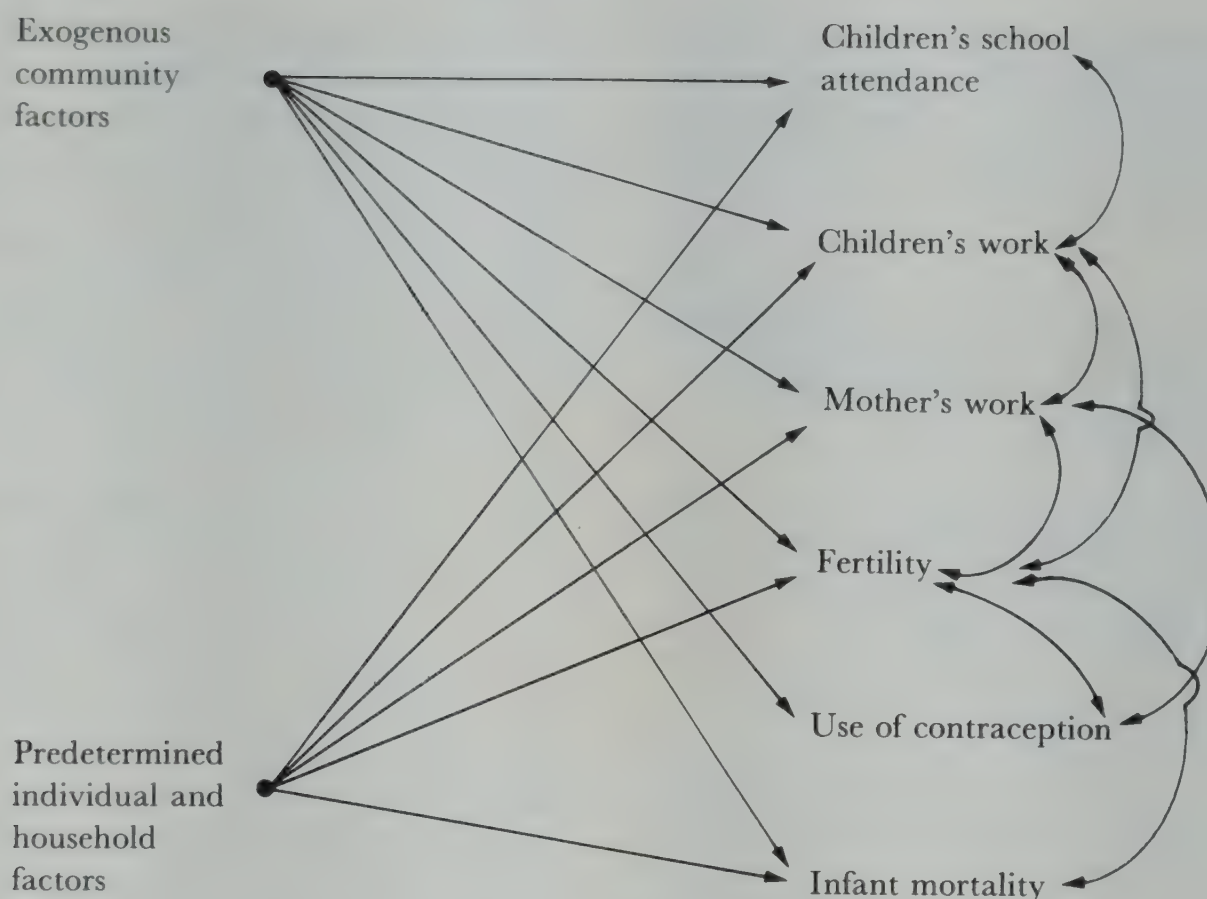


Figure 19.3 Model 3: a model of fertility incorporating limited household-level endogeneity.

endogenous, not just a right-hand side variable. What is exogenous is the availability of contraceptives in the community.¹ Similarly, the woman's own employment and earnings may be seen to be endogenous as well, influenced by her accumulation of work experience during her married life (as interrupted to varying degrees by her childbearing). What is exogenous is the employment conditions for women and others in the area, and the prevailing wage rates.² Thus community-level data are crucial for improved model formulation and estimation.

- 2 Community-level variables are close to being policy variables, in contrast to individual and household variables prepared from household surveys. Governments develop policies to influence not par-

¹In a long-term sense this is not always the case – for example, if the demand for family planning services by area is somehow known by the policy-makers and they respond efficiently by establishing new clinics etc, in areas of greatest need. But this is very uncertain. More important, one individual's demand will not influence such a decision.

²Of course, when migration is considered, the conditions in the area can be seen to be not given but subject to residence location decisions. The purist might even go so far as to state that *all* household characteristics and decisions are inter-related and hence endogenous, and hence impossible to statistically estimate.

ticular individuals but rather *aggregates* of individuals, of particular types or from particular areas, or the population as a whole. A government cannot fully determine the education level of an individual, but it can influence the general level and the educational distribution through the provision/location of schools. The same is true for the use of fertility regulation methods.

- 3 Community-level surveys also have cost in their favour – or perhaps it is their cost relative to their potential policy value (see points 1-2 above). This refers in part to the fact that it will be cheaper to collect data from a few community officials in each of 100 communities, than from 5000 households in the 100 communities. Nevertheless my preference is for the collection of both individual/household and community-level survey data. In this situation the (marginal) cost of the community-level data collection effort is likely to be even more modest. For example, suppose cluster size (number of households) averages 50 and that three households per day are attained by the household interviewer. Then a team of four interviewers and one supervisor can cover the cluster within five days; but a single community interviewer might well complete the community survey in one day, or at most two. So the cost could be something less than one-tenth the household survey cost.

And the marginal cost could be less, given that the local government officials — possible respondents³ in a community survey — usually need to be contacted anyway before undertaking the household surveys in the community.

19.2 METHODOLOGICAL ISSUES IN COLLECTING COMMUNITY-LEVEL DATA

The issues discussed briefly here are (1) the definition of 'community', (2) contextual vs global variables, and (3) alternative sources of community-level information. (See also Bilsborrow 1984).

Definition of a 'community'

There are many possible approaches to defining a community. Alternative dimensions include: population size; socio-psychological-ethnic composition or closeness (integration) of individual relationships; extent of internalized economic activity and integration relative to trade with other areas; topographical/geographical characteristics; and political-administrative boundaries. An early, well-known definition is Hawley's (1950: 257), 'From a spatial standpoint, the community may be defined as comprising that area the resident population of which is inter-related and integrated with reference to its daily requirements'. This parallels a more recent definition in McNicoll (1975: 8): 'The choice of unit must satisfy two conditions: first, that it possesses either a legitimate internal administrative structure or an informal means of social control over its members; and second, that these members can at least partially identify their own interests with the interests of other members'.

Other functional definitions have also been suggested. One, applicable to areas where most people live in low-income countries, is that of a 'village'. As Connell and Lipton (1977) noted:

'the characteristics are agricultural livelihood and production; geographical differentiation of habitation; geographical differentiation of rights in land; work places for most people within the same geographical differentiated boundaries as those of their habitation; small population size; a high proportion of internal transactions; and some degree of administrative differentiation' (pp 11–12).

³I do not feel they should be the only community-level respondents, but that there should be several respondents (see 19.2, Sources of Data for Global Variables). This will reduce the cost advantage somewhat, but it will probably still be substantial in most situations.

The most usable of these criteria is population size,⁴ but even this involves an arbitrary cut-off point, which could hardly be the same in all countries. Among the authors of existing community questionnaires, Freedman (1974: 13) recommended an upper limit of 10 000 people for implementation of the WFS community questionnaire. Indeed, in the WFS programme community questionnaires have been implemented almost exclusively in rural areas and small towns/villages.

The problem of defining community in an urban context is more severe, since a clear functional demarcation is seldom possible because extensive transportation and communications networks blur functional definitions of urban neighbourhoods or districts. An alternative is to regard the entire city (and even metropolitan area) as the appropriate entity. This makes sense, particularly in towns and small cities, where instead of the availability of facility X the density of X types of facilities in the city can be computed and contrasted (in the analysis) across cities. But for large cities this implicitly assumes that all residents, regardless of location or socio-economic characteristic, have identical access to urban employment and services. While public transportation does provide wide access, and makes it possible for people to live in one part of a city and work in another, the extent of non-work related movement can be easily exaggerated. For example, in the Philippines, around three-quarters of the use of various facilities (schools, health services, food marketing etc) was within three blocks of people's houses (Popkin *et al* 1980). In Indonesia, the urban population lives in clustered communities called *kampongs*, which are self-sufficient in most services. While urban areas in most of Latin America and Africa do not have such clearly demarcated urban communities (and the widespread availability of private cars increases individual mobility in Latin America), clear areal differences still often exist that can be considered in analysing community structural and institutional factors.

Functional principles for defining 'community' are fine in theory but unfortunately of limited use in practice. They are useful in practice only in studies of a small number of communities where it is feasible to investigate the social and economic functioning of each community and its members in detail and over a sufficient time period to establish functional boundaries specific to the study.

For a full-scale fertility survey a large, represen-

⁴Even so, the criterion that people live where they work is very confusing in areas of high circulation or commuting. Suburban areas would then be defined as part of the city community.

tative sample of communities (with a large total sample of households) is desired. For this some sort of sample frame is necessary for choosing communities. This frame will usually be a list of political/administrative areas, such as states, districts, subdistricts and villages. The usual basis for defining a community will thus be the political/administrative definitions and boundaries actually used in the country. Countries differ greatly in this sense, which is one of the barriers prohibiting exact comparisons of community-level analyses across countries. For example, the lowest political/administrative-level communities in countries like Indonesia, India and China (a village, or commune or brigade) involve well-defined boundaries, usually highly clustered dwellings, high levels of socio-economic integration, individual identification with the area, and more-or-less strong local government leadership. Moreover, in some situations, such as in many villages in East Java, accurate and detailed village records are kept on fertility, family planning, and a host of useful socio-economic characteristics. In most other developing countries the situation is very different, with scattered rural dwellings, people using *sui generis* place names and not knowing their lowest administrative unit, weak local governments, and no written records. This appears to be the situation in most rural areas of Africa and Latin America. In such conditions there may be few or no administrative records available to compare community-level survey data with, identifying the appropriate community-level respondent(s) is difficult, and the value of community-level data collection is called into question. At a minimum, considerable circumspection is warranted before making a decision to undertake a community-level survey in these situations.

Contextual vs global variables

One way of preparing a community variable is to aggregate data collected for individuals or households in the community from a household survey. This can lead to variables such as mean fertility, per cent attending school, land ownership distribution, etc. Variables based upon such aggregations are often called 'contextual' variables. To the extent one wishes to examine, for example, the extent to which the mean education level in the community has an effect on fertility independent of the individual's own education, these variables have a meaning and utility in and of themselves. This may also be true of variables which measure the deviation of the individual or household measure from the group mean or norm. That is, one's relative education (or income) may influence fertility in addition to the level of one's education.

The second type of community-level variable is one for which a corresponding measure does not and cannot exist for individuals. Such variables are often called 'global' variables: for example, whether there exists in the community a family planning clinic, primary school, paved road, etc. Although the presence of a facility greatly influences the extent to which individuals in the community have access to it, the two are by no means the same. For example, a community may have a school but not all children attend: some live too far away, others have farm duties, etc. On the other hand, it may not have a school but some children in the community attend school in neighbouring communities. Finally, even if people are aware of the presence of a facility, there may be a difference between their perception and reality. For example, they may think that there is no bank when in fact there is, or they may think the family planning clinic is 20 km away when it is only half of that (see also Tsui, chapter 5; Bangladesh *First Report*; Casterline and Engracia 1984).

Even more important with respect to global variables, the fact that a facility exists says nothing about its actual use or availability to different members of the community. This depends not only upon the obvious — its physical location relative to the location of dwellings and transport service — but also its accessibility. For example, secondary schools or factory jobs may only be accessible to males (because of legal restrictions or cultural norms); a family planning clinic may practise *de facto* discrimination against the poor or against minority ethnic groups; electric lines may exist only within a certain (eg high-income) portion of the community. Thus it is crucial for global variables to ascertain not only the existence but also the actual use level. Most existing questionnaires have completely neglected this dimension.

Whenever a household survey is being implemented, the preparation of 'contextual' variables is certainly easier than the separate administration of community questionnaires, since much of the basic data will already be available. However, in practice there are a number of difficulties with the computation of contextual variables which must be borne in mind in deciding whether a separate collection of global variables by means of formal community questionnaires is desirable.

First and foremost, contextual variables can be reliably estimated only if the sample of households is sufficiently large and representative of the particular community. In most situations, where the fertility survey covers a large region or a country, the procedure for economically selecting households is a cluster sample. This cluster will usually not be representative of

the community, since it is not selected for that purpose but for economy. Secondly, the number of households per cluster may be too small (eg 10 or 20) for such aggregates to be meaningful.

Nevertheless, there are important situations where contextual variables are useful: (1) when the model requires them, such as group means and individual deviations from the mean;⁵ (2) where the global estimate of the variable, eg mean household income or attitudes towards local political leaders, is expected to be unreliable (see below); (3) when it is financially or politically impossible to implement separately a community questionnaire to supplement the household survey (though this financial argument is rarely valid, see 19.1); (4) when the cluster size is not too small; or (5) when the variation within the communities being studied is so small that any random selection of a cluster of households is unlikely to be unrepresentative.

If it is known *a priori* that community- or multi-level analyses (Scheuch 1974; Bilsborrow 1984) are to be performed and that the community-level variables are to be contextual variables prepared from household data, cluster sizes should be larger (say, 50 or more households) and households selected should not be from a cluster but more randomly distributed to be more representative of the community. Moreover the individual questionnaire should be designed to incorporate questions that collect, insofar as possible, information about any desired global variables in the community, such as whether the community has a health clinic, distance to district capital, etc.

In practice, of course, the information provided by the individuals on global variables in the community often will not be sufficiently reliable to justify the effort. For example, the average respondent is not likely to know the total land area or population of the community, mean landholding size, proportion of dwellings with electricity etc, unless the community is very small. Differences between the actual vs perceived presence of community facilities, local government policies (including commitment to family planning) and development projects, community wage rates, the main crops and non-agricultural economic activities, levels and trends in fertility or infant mortality in the community, whether unused land exists, and land

values and recent trends in land sales may also be significant.

On the other hand, some community variables are probably better obtained from households than from community leaders — eg concerns about and extent of popular participation in decision making. Information about some variables of interest can rarely be obtained except from individuals: (mean) household income and employment; remittances; all attitudinal variables, including towards community officials; desires for children; attitudes towards family planning methods; perceived availability of community facilities; breastfeeding, post-partum amenorrhoea and coitus; and perceptions about employment opportunities in the area. Thus some community information can be best estimated by aggregating across households, ie computing contextual variables. But the representativeness of the cluster of households must always be considered.

Sources of data for global variables

There are at least four possible sources of data for community variables: (1) published records; (2) interviews with informed persons, such as community leaders; (3) interviews with groups of community residents; and (4) direct observation. The first source exists only for administrative/political jurisdictions, and is thus useful only where the 'community' is thus defined, while (2)–(4) are potentially useful whether the community is such an administrative area or a smaller, functionally defined area.

Published records on some limited topics for the community, defined as an administrative area, may be available from the central, provincial, or local government office. The data may be obtained from a census (as the national census of village facilities in Indonesia), a previous survey, a registration system, or administrative records. In Indonesia many villages in Java maintain accurate records of births. But registration records are the least likely source in most countries and vary in quality even in Indonesia. Much more common are areal statistics from various types of censuses and administrative records. They have both the advantage of ready availability and low cost: even ferreting out unpublished tabulations or obtaining new computer print-outs at the level of disaggregation desired is far cheaper than collecting the data anew. Many low-income countries conduct a variety of censuses in addition to those on population and housing — on agriculture, education, health facilities etc. A variety of administrative records are also prepared by government statistical offices and ministries. While

⁵More generally, if the cluster is not representative of the community and the global variable is, and is not obtainable for the area where the cluster is located, and if multi-level analysis is to be carried out, contextual variables computed from the households in the cluster will be preferred measures of community-level variables. If such analysis is intended, the household questionnaires should be designed to explicitly collect key community (cluster) variables.

they will often be out of date and have inaccuracies,⁶ they can still be useful, if only as a check on the community-level data collection for certain items.

The usual source for more detailed and up-to-date information is likely to be community informants, who ideally are fairly well informed about community facilities, its economy, and people's lifestyles. They may be village officials, political party leaders, local agriculture extension workers, teachers, doctors, family planning workers, government malaria eradication employees, etc.

In many situations — where no single respondent is knowledgeable about all relevant aspects of community life, where there are differing and conflicting views and interpretations, or where self-interest is thought to bias significantly the answers of the respondent — it will be desirable to interview more than one person. Thus the village leader or official may be a large landholder who is aware that the size of his holdings violates national laws regarding maximum size of landholding. His responses about the distribution of landholdings, whether any land reform has occurred in the community and its effects etc, are likely to be significantly prejudiced. Family planning workers may exaggerate the number of women they contact per day, or the demand for contraceptives. Village officials may exaggerate the area, population size, and presence of community facilities, while understating out-migrants, time it takes to get to the provincial capital, and so on.

Thus whenever detailed community data are desired and it is not too inconvenient or costly relative to the survey timetable and resources, it will be desirable to seek out the person most likely to be well informed about the topic: for example, a local school official about school facilities, hours and enrolment figures; a local doctor or health official about health facilities, common illnesses, and health practices of community residents; and a midwife for information on childbirth and perhaps breastfeeding customs. In the development of a prototype community questionnaire for the ILO book (Bilborrow 1982), I put the more detailed questions — usually answerable only by a knowledgeable authority or specialist — in optional modules. The core questionnaire is thus assumed to be normally completable on the basis of government records and interviews with local government officials in the government headquarters. If a variety of specialists respond to different sections, each section of the

questionnaire should have a place to designate the respondent and his/her title or employment to take into account the source in using the information later in analysis.

The attitudes of the chief political/government official(s) may constitute important global community variables in themselves. They may reflect the political/economic power structure and belie local government policies *de facto* that differ from *de jure* (for example, an official who says there is no problem with land distribution in the area when other data indicate great inequalities; or who is against family planning though the national government has established a clinic in the community to promote it). Similarly, the dedication and attitudes of health workers may have much to do with which community residents use the clinics and how often, health practices *vis à vis* boiling water, breastfeeding prevalence etc.

The third approach to community data collection, interviewing a group of respondents together, is related to (2) except the group members are not government officials. In close-knit communities this is consistent with local customs. It was found to work well in a community survey of villages in Bihar, India, in 1981.

A fourth approach is direct observation, wherein, for example, trained anthropologists live in a community for at least several months, observing people's customs, economic transactions, and talking with them about what they see and asking questions, to form in-depth impressions about the community. This can materially assist the formulation of individual and household schedules, as well as their later interpretation. However, the cost of such intensive data gathering is very high, so that usually only a small subsample of communities can be thus observed.

In concluding, we suggest that the approach that will usually work best is to compile what is available for the sample communities from written records before going to the communities in the field, but then rely mainly on detailed structured interviews with community officials and informants. Occasionally the other two approaches listed above will prove useful supplements. It should also be emphasized that the greater the number of community informants to be contacted, the greater the cost of not only collecting the data but also subsequently sorting and processing it. Certainly a major need is for methodological analysis to determine the best respondent for each type of information. Since this will vary by country, some pre-test experimentation will be needed in each country, whatever the general criteria developed. In any case the community data should be obtained from more than one respondent whenever possible.

⁶Geographic boundaries may differ for different types of administrative records and may differ from those used in census — eg school districts, health planning areas, election districts

19.3 CONTENT OF COMMUNITY-LEVEL QUESTIONNAIRES FOR FERTILITY ANALYSIS

In one sense we know little about this topic — we have had very little experience and analyses to date have not been particularly encouraging (see Engracia, chapter 2, Casterline, chapter 4 and Tsui, chapter 5 and other papers in this volume). On the other hand, there are good reasons to pursue this topic further (see 19.1).

Two background documents for the Seminar present prototype community questionnaires. The first was developed for WFS by Ronald Freedman (1974), and the second was part of a set of questionnaires developed at POPLAB in 1980-1 to permit more intensive study of the determinants of fertility than we thought was possible with the WFS schedule (see Sullivan *et al* 1981; Bilsborrow *et al* 1982). The first was used as the basis for developing community questionnaires which were implemented in a number of countries participating in the WFS programme (17 out of the 42 developing countries). Actual questionnaires used by countries sometimes differed considerably. It was expected that the POPLAB schedule would be adapted and fully implemented in two countries during the course of the present (terminating) POPLAB contract, and that a series of companion manuals for interviewers/supervisors and for analysing the data would be developed, but budget reductions precluded this. As a result neither the community questionnaire nor the four individual questionnaires comprising the package has been utilized in the field. It is thus a bit pretentious to compare the POPLAB community questionnaire with that of WFS. What follows is, nevertheless, a detailed comparison of the instruments, with suggestions about potentially useful extensions based largely upon lengthier schedules and developed for the analysis of internal migration in developing countries. In the course of the latter a number of other community-level schedules were located.

A comparison of WFS and POPLAB community schedules

Looking through table 19.1 I might proffer some 'micro-explanations' of differences between the POPLAB and WFS community questionnaires, beginning with demographic and transport linkages considered together. First, the age-sex distribution may affect nuptiality and exposure to childbearing in the community, and migration flows may influence desires for children vs alternative uses of time and money resources, attitudes towards contraception and breast-

feeding, and economic technology. Transport linkages are similar indicators, but do not indicate the extent of long-term exodus or arrival. Questions on the actual extent of intra-community contact — especially commuting, circulation and short-term or seasonal migration to other places (and the main characteristics of those places, such as whether cities or rural areas) — might be useful to add as more direct indicators of contacts and thereby potential modernizing influences.

With regard to the geographic topic, the total land area may be important to permit compilation of population density, which may influence fertility. An additional question, to identify whether the community is located next to a major body of water (ocean, lake, river), was added in the ILO community questionnaire. The topography may be directly useful in extreme cases (eg the lower fertility of Indians in Andes communities), but will often be reflected in transport linkages. But in a long-term government planning sense, if transport linkages were found to have important relationships with fertility, and the government were considering whether to expand them in a community, the topography would influence the cost of that expansion (as well as the cost of certain other community installations, such as sewerage, water and electricity). (Thus community data can have wide utility for government planning.)

In the many types of community facilities and services that follow, POPLAB included the mode of transport, attempting to ensure that the time to get to X was clearly linked with a mode. Moreover, in view of the likely higher-than-average economic status of the community respondent, he is asked to first identify the mode that would be most commonly used by community residents for various destinations or purposes. Asking the mode for many different items may be excessive since the same mode may be used for most, particularly if things not available are all most closely available in the same place (eg all in a nearby town or the district capital).

Regarding education, we slipped here (corrected, and further expanded in the ILO community questionnaire): the WFS questions are clearly better here. It would usually be desirable to inquire about both primary and secondary education, and by sex as well, though such details can produce shaky data if the respondent is not a specialist on the topic (ie an educator).

On the other hand, I feel the POPLAB health and family planning questions are better. The proportion of children receiving medical care when sick is probably much less reliable than the proportion of women receiving medical attendance at birth. On family planning POPLAB asked specifically about family plan-

Table 19.1 General differences between POPLAB and WFS community questionnaires

POPLAB	WFS
<i>A Demographic</i>	
Same, plus crude or detailed ^a age-sex distribution	Total population, per cent in ethnic/religious group
Whether people moving in/out	Omitted
<i>B Geographic</i>	
Total area. Whether mountainous etc	Omitted
<i>C Transport linkages</i>	
Similar, plus most common means of transport to each	Distance and time for travel to nearest town of 10 000, 100 000, market centre, all-weather road. Means of transport to nearest market centre outside community
<i>D Education</i>	
Same, plus mode of transport. Also presence of college, day care centre	Primary and secondary school presence; if not, distance and time to get to
Secondary omitted. Sex omitted	Proportion of boys and girls attending primary and secondary school
Proportion literate only	Proportion of adults literate, and proportion who completed primary and secondary school
<i>E Health</i>	
Same, including mode of transport	Availability of following in community: modern doctor, traditional doctor, midwife or nurse, other health worker, hospital, clinic, pharmacy or dispensary; if not available, how far
Proportion of women with trained medical person attending birth	Proportion of sick children who receive medical care in first week of illness
<i>F Community services</i>	
Same, plus year when first available	Whether community has electricity, proportion of households with electricity
Excluded	Whether community has drains, garbage disposal, land registration or tax collection office, vital registration office
Proportion with piped water; also with latrines or toilets	Proportion of households with treated water
Same, plus proportion with dirt floors	Proportion of households with radios
Same, plus availability of bank, movie theatre, television	Newspaper circulation; availability of telephone, telegraph, post office, police office
<i>G Family planning</i>	
Same, plus mode of transport, whether resident or visiting FP fieldworker; and how long ago FP became available	Availability of hospital, clinic, family planning worker, or pharmacy that distributes contraceptives. If not, how far
Proportion currently using any FP method	Proportion of married women (15–44) who have ever used services from organized FP programme, or ever used any form of birth regulation; acceptors in official FP programme ^a

^aWhen written records are available.Source: Bilborrow *et al* (1982); Freedman (1974)

ning fieldworkers (ie about 'outreach') and also the key question about when family planning first became available. This could be made more specific by additional reference to when an official outlet was instituted, which would be desirable in countries with official programmes. Finally, the proportion of women (why married in WFS?) currently using a method would appear both more reliable and more useful than the proportion ever using a method. Clearly, if the country has an official programme with many clinics/facilities/personnel, it would be useful for fertility analyses to obtain far more information, such as the number of clinic personnel of various types, days and hours the clinic is open, average waiting time, methods available and dispensed, costs of methods, time-series clinic data on acceptors and users, extent of outreach/promotional efforts, use of fieldworkers etc. Attitudes of the top community government official or other key residents (teachers, religious leaders, doctors etc) towards family planning could also be useful here. I cannot help but recall the Indonesian village where a large drum (*kantor an*) was struck each day at 6 pm to remind women to take their pill.

Regarding other community services, there are some differences, such as the inclusion of more legal facilities and functions in WFS, while bank, movie

theatre and television are asked in POPLAB. The former would not seem relevant to fertility, though they indicate sources of official records which may sometimes be useful. Finally, more information about housing and sanitation conditions is included in POPLAB. These relate more directly to infant/child mortality than to fertility.

There are larger differences in topic coverage between the WFS and POPLAB community schedules on economic topics (see table 19.2). If there were not appropriate written records available on land ownership etc (usually the case), WFS would obtain only two pieces of information: (1) whether a business exists in the community (and if not, how far away), which both employs more than ten people and uses mechanical power (why the restriction to this combination?), and proportion of labour force working in such an establishment (probably very unreliable); and (2) agricultural technology. I see little value in (1), though identifying major employers in a general community questionnaire and then separately interviewing them later as part of a more detailed community inquiry could be useful (see Bilsborrow 1984, optional employer's submodule). In particular, this would help in specifying representative community wage levels, truly exogenous variables that play important roles in statistically

Table 19.2 Differences in economic topic coverage between POPLAB and WFS community questionnaires

POPLAB	WFS
<i>A Employment</i>	
Major sector of employment of workers in community	Omitted
Omitted. Instead, proportion of women who work for pay, sector, wage level. Same for children aged 10-14	Whether a business exists which uses mechanical power and employs at least ten people. If not, distance and time to Proportion of community labour force working in 'such an establishment'
<i>B Agriculture</i>	
Private vs collective land ownership	Average size of landholding, value of agricultural output (total and mean per farm/capita) ^a
Typical size private landholding, and how changed in past ten years	
Crops only	Major crops, per cent of acreage in each ^a
Proportion of households with no land, less than one hectare, 1-4 ha, 5-19 ha, 20+ ha	Number and per cent of adult male agricultural labour force who are owners, tenants, farm labourers, family workers ^a
Omitted	Proportion of farms using powered equipment, chemical fertilizer, new crops or seeds, irrigation from a 'public source', and being visited by agricultural extension agents

^aWhen written records are available.

Source: Bilsborrow *et al* (1982); Freedman (1974)

estimating the determinants of fertility in an economic model of fertility (see 19.1). Note that the POPLAB questionnaire includes several questions on the community labour market in relation to women's and children's work. I now see that it was a mistake to concede to pressures to eliminate parallel questions for men.

We also sought to identify the major sector of employment, whether land was collectively or individually held, and whether the typical size landholding had changed in the past ten years (reflecting increasing population pressure). This could be related to agricultural technology, as a Boserupian consequence of high fertility – included in WFS but not POPLAB (but covered in more detail in the ILO volume, Bilborrow 1982). I think the land distribution questions in POPLAB are more relevant to fertility than the labour force distribution questions in WFS.

Additional potentially relevant community data

A large amount of additional information at the community level, especially, but not limited to, economic information, may also be useful for fertility analysis. Some was included in my earlier drafts for the POPLAB committee but because of pressures of the other members to minimize the length and complexity of the questionnaire, combined with my own inability to convince them of its special importance, it was not included in the final version. However, it was included in the ILO questionnaire, which, in focusing on internal migration, has a broader economic mandate. In order to eschew listing all the additional topics therein,⁷ I will list only those that appear potentially important for fertility analysis, though some would appear more directly relevant for mortality or migration analyses.

These include, first, from the Community Core Questionnaire (CCQ), specifying whether various facilities available in the community were also available, say, five years ago. The *year* in which they became available would also be useful for studying differences in recent fertility across communities or over time within communities. This information may be sought for a key subset of facilities, such as schools, health facilities, piped or treated water, and electricity. Secondly, much more detailed information on education would be useful because of its relationship to the value/cost of children and children's (and mothers')

work. Such data include, for each level, total students matriculated by sex, teachers, and classrooms; number of grades available (especially important and highly variable across rural primary schools); school costs (tuition, fees, uniform); months when the school is in session (to compare with the agricultural cycle); and the location of the school relative to the community population centre.

The additional general economic information might include estimates of the proportions of adult women and young boys and girls (say aged 10-14) who work away from home; whether there is a tendency for boys and girls to move away from the community when they reach adulthood; the major types of paid labour for adult males (as well as females and children) in the community and the wage rates; the existence of recent community or government development projects, their nature and scope; the existence of labour unions and producer/consumer co-operatives; and the types of social, political and religious organizations and their membership/activity level. Whether any businesses that employ over ten workers throughout the year exist, and whether instituted in the community in the past ten years is also useful, the former to identify respondents for employer surveys (if desired – see below) and the latter as an indicator of changing (improving) employment conditions.

A considerable amount of additional information on agriculture could be usefully experimented with *vis à vis* fertility. From the CCQ this includes distinguishing the distribution of household heads among landless labourers, tenant farmers and sharecroppers, peasants, medium-size farms, large farms, and communal and collective landholdings. A broader-than-WFS list of changes in agricultural technology could also be very useful, but specifying whether introduced within the past five years. Negative developments, such as land falling idle because of out-migration, should also be sought. It would be helpful to know whether any such changes have especially benefited or affected small vs large farms. The level and regularity of rainfall, and whether there has been any major flood, earthquake, epidemic or crop pestilence in recent years should also be sought as these interrupt normal childbearing patterns, both directly and through their economic effects. Whether agricultural production has increased or not in recent years, and the levels and trends in the prices of the major crops grown are similarly useful. Finally, prevailing norms regarding inheritance customs in the community are important exogenous indicators of the old-age security value of children (Leibenstein 1957).

A wide range of additional information could be useful if respondents particularly knowledgeable about the topic are generally available in all communities in

⁷See Bilborrow (1984). The earlier version of this analysis has already been cited and was published by the ILO as a booklet (Bilborrow 1982, available from the ILO in Geneva).

the sample, as indicated by the supplementary sub-modules in Bilsborrow, Oberai and Standing (1984: chapter 11). For example, employers might be asked the wage rates they pay and whether their production is expanding, and renters, the rent they charge. The distribution of total community land among cultivable but not cultivated land, meadows, forests, mountains, deserts, and urban area can indicate pressures on the land. Changes in landlessness, rent payments, and wage levels in the past five years may be useful, as may detailed information on land use by crop, yields, labour inputs needed (indicates demand for labour), mechanization, prices and number of harvests in the last year. The importance of and recent changes in conditions of animal raising will also be important in some regions. The availability and cost of credit, particularly to small farmers, is an important alternative source of economic security to children. The extent of and prices of recent land sales, including identifying whether the buyers are principally large landholders, can be another important indicator of trends in economic conditions. Of course, all such information should be examined in pre-tests to determine which indicators are most feasible to collect and most related to fertility.

Finally, more details on certain community, education, health, and attitudinal factors may be useful. On education, the existence of day care centres and their attendance, how long it takes children to get to school, the extent of and reasons for non-attendance, and the ages of normal school attendance and labour force entry. For health information, the extent of use of modern vs traditional doctors; the adequacy of supply of medicines; the extent to which infants and children are vaccinated; the drinkability of community water (piped or 'treated' may not be potable); breastfeeding norms and associated taboos; prevalence of any endemic diseases in the community and recent trends; existence of disease prevention, hygiene, or other special health education programmes; and levels and recent trends in community fertility and infant mortality. Such information cannot usually be reliably obtained from public officials (in the normal absence of good written records), and may best be obtained from a public health worker or doctor.

There remains a final set of community factors that have been neglected up to this point — the attitudes of community leaders, officials, opinion-makers etc towards family planning programmes, other community services that may impinge on fertility, and individual/group norms regarding childbearing. Such attitudes will of course be implicit in the actual availability and quality of family planning programmes. Perhaps the number of births fathered by the com-

munity respondent is another indicator: actions speak louder than words. While I have a strong preference for using variables derived from behaviour rather than underlying attitudes, this may be a case where the latter is especially useful. For example, in a village where the leader publicly promotes family planning, the level of family planning use may well be higher than in an otherwise similar village, despite the large size of the leader's own family. But this is another of many hypotheses requiring empirical examination.

19.4 SOME IMPLICATIONS

The first step is to measure whatever can be easily measured. This is okay as far as it goes. The second step is to disregard that which can't be measured or give it an arbitrary quantitative value. This is artificial and misleading. The third step is to presume that what can't be measured easily isn't very important. This is blindness. The fourth step is to say what can't be easily measured really doesn't exist. This is suicide.

Daniel Yankelovich: quoted in A. Smith (1972) *Supermoney*, NY: Popular Library.

This paper has attempted to indicate the theoretical importance of collecting community-level data for fertility analysis and has provided some suggested guidelines. But all must be taken with a grain of salt since we have so very little experience: we are only at the first step, if that. But we need to push forward and eschew the other steps of Yankelovich.

Unfortunately, in practice the collection of the desirable community-level information comes up against several problems, not the least of which is the definition and delimitation of 'community'. The definitional problem is greater in areas where local governments play only minor roles in the lives of the people and where maintaining records is minimal, and in large cities. As a crude generalization, definitional questions for rural areas appear to be less serious in most of Asia than in Latin America and Africa. A related issue is what kinds of community variables to formulate — so-called 'contextual' variables, computed as means across individuals in the community from the household survey, or 'global' variables obtained independently. In certain unusual situations and for certain subjects, contextual variables are both feasible and preferred.

Nevertheless, for most community variables, global variables are preferred. This is especially the case when it is recognized that both (a) the usual sample frame for the household fertility survey will be based on political subdivisions such as subdistricts, and (b) a useful

source of information on some community variables already exists in the form of government records for political subdivisions, particularly from census data or administrative statistics. But while such data can be useful and can be compiled at low cost, they are often not up-to-date or accurate and, more important, only skim the surface of potentially useful community-level information for fertility analysis. Therefore a specialized community-level survey involving interviews with knowledgeable community officials or informants is recommended.

There is need for wide experimentation — to 'let a hundred flowers bloom' to paraphrase Mao in the first liberalization (1960). Definitional and operational problems will differ across countries, so I see little need to construct and actually use a lowest common denominator type of schedule everywhere in order to be able to compare the effects across countries. Rather, careful pre-testing and extensive adapting of any standardized schedules is preferred. Given the small number of community-level questionnaires to process (eg 100 vs 5000, say, in a household survey), it is not even necessary that all questions be close-ended. There is also need for experimentation in the pre-test to determine the most reliable respondent for various topics, which will also vary across countries. Testing the accuracy and validity of community-level data is crucial, first steps being perhaps comparisons of answers given by different community respondents to the same question, and comparisons with data prepared from the household responses (see Casterline and Engracia 1984; Bangladesh *First Report*). Urban areas should not be excluded, but the questionnaires will require some adaptation (eg see Bilsborrow 1984).

Finally, there is a need for careful selection and training of community interviewers. The process should be approached with the same care as the training of household interviewers, and probably take at least as long — eg several weeks or more, including field trials, taping interviews etc, in contrast to the typical one or two days (if that) of 'tacked on' training given to supervisors expected to administer community-level questionnaires in the past. (An example of a careful procedure for developing a community questionnaire (in Thailand) is described in this volume by Chayovan and Knodel, chapter 15.) But everything is inter-related, and the prevailing tendency to use excessively brief, simple community questionnaires is consistent with the lack of care given to their implementation or to their value in analysis.

Back when detailed household fertility surveys were first proposed with the Indianapolis survey, it was said to be impossible to collect reliable fertility data by means of a household interview (see eg Westoff *et al*

1961: 6). Perhaps we are now at a similar threshold with community-level data collection.

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20 Summary Observations on the WFS Seminar on Collection and Analysis of Data on Community and Institutional Factors

Ronald Freedman

There was a consensus on the desirability and importance of studying the social context, environment, and normative structure at the level of the local community and, perhaps, also at other levels of collective social institutions. This is reassuring, since the importance of considering such collective variables was the motivation for developing the WFS community-level module. There is criticism from different sources of many aspects of the WFS module, including the concepts, the specific variables, and the methods of collecting the data. Nevertheless, I think we end with a consensus that the general objective is so important that continued effort to devise a modified instrument is definitely worthwhile, although there is disagreement about the specific means of meeting the objectives.

The consensus is notable in view of the fact that the results to date are mainly negative. As John Casterline pointed out, a few variables — electrification and community levels of education — were significantly related to fertility in several countries. Community accessibility also has significant effects in some countries, and some findings are suggestive of the relevance of certain types of social pressure. There is one paper by Tienda (1983)¹ which indicates that accessibility to the outside world has a significant relation to fertility, net of significant micro-level controls. These few studies with positive findings are encouraging. Overall, however, the findings are disappointing. I expected more, despite the crudeness of the measures. Amy Tsui also reports largely negative findings with respect to contraception.

It is important to ask why the results were not more substantial. A good deal of the discussion fell under this heading. If we have some idea about why we got null results, it may be possible to improve the research and obtain better and more satisfying results. Our expectation that we can do better rests in part on the faith

or basic assumption that social context or social normative variables must affect fertility, even if we have not properly measured such effects up to now.

The first possible explanation for the negative results is that the quality of the data is poor because of the method of data collection. This should not be surprising because the community-level module was treated very casually in the field. There was no special training or explanatory manuals, unlike the core questionnaire. Moreover, in almost every case, I believe that there was very little training of interviewers and the data were collected as a marginal task while the interviewers were in the area. Relatively little time was devoted to selecting or interviewing the respondents. So far as I know, there was no checking of data with the respondents.

A number of suggestions made at the Seminar especially by Chayovan, Knodel, and Bilsborrow, might improve the data substantially:

- 1 having a small team of interviewers to specialize in collecting these data;
- 2 having multiple respondents, including respondents for special areas of expertise;
- 3 having the interviewers talk with respondents in a group;
- 4 checking the responses with documents where possible.

A case can also be made that better data and more complex variables could be obtained if the data were collected by professional social scientists with some sensitivity to the society. The report by Graeme Hugo (chapter 10) suggests that it is possible for such a person to benefit from the cumulative insights that come from spending a considerable amount of time in a set of villages. This involved on his part a pre-testing orientation that is desirable even if less skilled interviewers are used. If specialized community-level interviewers are used, they should not only become more skilled but they should also be more capable of insight into the dynamics of the villages.

If the question of collecting the data is taken

¹Tienda, Marta (1983). Community Socioeconomic Differentiation and the Education-Fertility Relationship in Peru. Working Paper no 83-36. Madison, University of Wisconsin, Center for Demography and Ecology

seriously, it is possible that a substantial improvement in the accuracy and quality of the data might change the measured relationships between the variables even as presently defined. Further, the better methodology should make it feasible to collect better and more complex data.

It is possible that an improvement in methodology would not produce stronger results. I hope that the Chayovan-Knodel investigation (chapter 5) will lead to conclusions about whether better data-collection methods do produce stronger results. Even if they do, there is still a case for substituting or adding variables that have a stronger theoretical basis.

It is relevant that the selection of very simple items for the present module resulted partly from the expectation that the resources and professional commitment devoted to this task would be very meagre. I decided in preparing the module that only simple and obvious items would work under these circumstances. I had conferred with a number of distinguished anthropologists about village data and decided that the more complex data their work suggested could not be collected with the methods that were likely to be used. In retrospect, I should have made a stronger effort to improve the field methodology. This activity had very low priority with WFS at the time.

Another very plausible explanation for null results is that the wrong items and variables are represented in the module. John Casterline (chapter 4) and others have suggested that sounder theory and modelling would produce different configurations of variables. While I still think that most of the variables in the module can be given a theoretical rationale, they were chosen rather loosely. A more systematic approach might change the substance considerably.

A number of people have suggested that many of the variables should have a time reference. For example, when the family planning clinic was established determines the period when it could have affected fertility.

Bilsborrow has presented a considerable number of additions and modifications — in effect a new module — although including a fair number of WFS items (see chapter 19). These new variables are, on the whole, plausible. I hope they are tested empirically. *A priori*, I thought the WFS module had relevant items and that some would show significant results. I hope that these new formulations work out better.

An important question is whether the more subtle and complex variables represented in the work of Jack Caldwell and Mead Cain (chapters 8 and 14) can in some way be represented among variables in a community-level annex to a national fertility survey. Mead Cain ends his paper with a flat 'no' to this idea. I read

Caldwell as having a similar position, although he indicated that the module type of approach, if well done, has value for other reasons. While it is clearly not feasible to replicate their kind of work for a large number of communities, I suggest several approaches which extend the content of data gathered. First of all, some attempt should be made to replicate and test the approach described by Graeme Hugo. His experience suggests the possibility that several social scientists might become acquainted with a fairly large number of communities, perhaps first orienting themselves to the structure of the communities and then collecting systematic data as he did. One might, for example, deal with 10–20 communities semi-intensively instead of the mechanical treatment of 200.

Another possibility is to have a survey preceded by a considerable period of study of one or a few communities in a more intensive way. Whether this work should be directed by formal categories I am not sure.

It has been suggested that the findings of intensive community studies should affect the content of larger-scale studies. Why not take this seriously? For example, couldn't one section of a community module in a hypothetical forthcoming fertility survey in Bangladesh obtain community-level data on the environment of risk? Mead Cain said 'no' in his paper. But I wonder whether he might not think it worth some time to work with some Bangladeshis, if the opportunity were there, to see whether appropriate questions could be devised to measure the environment of risk questions. Testing the projection of his microcosm to a larger frame would be highly desirable. Presumably, a major point of intensive community studies is to understand a larger reality rather than a particular village.

While I am sure that we would all agree that the more sound intensive studies the better, the number must be limited by the fact that only a small number of people have the ability and commitment to do them. Ideally, there should be such a study in every country and they would be especially desirable in the period preceding regional and national sample surveys. Blalock (chapter 12) suggested that perhaps we should concentrate on such studies for a period of time. However, the limited number of people doing such studies don't do them on commission.

In any case, large-scale fertility studies are likely to be carried out whether or not intensive studies are also carried out. The question, then, is whether the opportunity to include a community-level module should be seized when possible. My answer is 'yes'. It is much too early to give up on this kind of study because in the early days a poorly conceived and executed attempt didn't work out.

A number of people have suggested that the study should be flexible and adapted to each cultural situation. The WFS module pamphlet suggested such variation and there is some variability in the actual questionnaires used. However, my impression is that this idea was not followed very much. This may be the result of the fact that the people in charge of the surveys tended to be statistical or survey specialists for whom the objectives of the community-level investigation were not always meaningful. Since we have already suggested that specialized people do the community-level survey, perhaps we should go further to suggest that a sociologist or anthropologist who is interested in institutional analysis as well as in demography be in charge of this activity where possible. They are more likely to adapt the instrument to the local situation.

Another problem, which may have affected the findings, is the definition of the community. There is, first of all, the question of whether the community of collective action and common normative and social structure corresponds to the administrative and legal community usually used as a sampling unit. It is almost inevitable that the administrative-legal unit will be the sampling unit in a national study. What can be done, however, is to check the more obvious discrepancies as part of the community-level survey itself. Where communities are very diffuse, as Bilsborrow suggests is the case in Latin America, there is a real question about whether standardized survey-linked community-level studies can be done prior to some work on how the units can be defined. Taking the functional social definition of the community literally may imply a considerable study of each community. That is not practical for a national survey. Perhaps what is needed is a study of how much difference there is between the social and legal-administrative community. In the end, I suspect that we will be left with the official statistical unit for large-scale surveys.

There was some disagreement about whether community (or locality or group) variables should be obtained by aggregation of individual data or at the community level directly. Ron Lesthaeghe (chapter 3) demonstrated that a study based on aggregation could produce very useful results and Linda Werner (chapter 16) discussed some of the technical data problems. My own assessment is that both types of data are needed for different problems and their value will be tested empirically. There seems to be little disagreement that, when suitable data can be obtained from the census,

local records, and other documents, they should be used at the aggregate level.

There do appear to be some variables not easily obtained except on the community level. For example, there are such variables as the community wage rate, the structure of the labour market, the other exogenous economic variables (in Bilsborrow's terms). There are also variables such as the attitudes of community leaders. While the perception of and reported usage of community facilities certainly must be obtained at the individual level, it might be a little strange if we did not also determine independently the objective existence of facilities and what services were offered, by whom, and under what circumstances.

Finally, let me make some recommendations for which I take personal responsibility, since there was not enough discussion of these ideas to determine the extent of consensus on all of them.

- 1 Community-level modules should be developed for national fertility surveys where a serious commitment of effort and resources is available.
- 2 The effort should be under the direction of a serious social scientist who, together with a small staff, would visit many communities in a pre-test of the ideas being investigated and then collect the community-level data by interview, observation, or document review. The data collection should involve a variety of individual and group interviews.
- 3 The content of the module should, as far as possible, be based on the theoretical models being investigated. They should, where feasible, involve promising ideas derived from intensive interviews.
- 4 The instruments must vary considerably by country. Further, the content will depend on the fertility theory being tested. It is premature to specify a common module. Whether they are derived from intensive community studies or not, it is desirable that community modules test not only the fairly mundane and obvious kinds of items they now contain but also some major institutional and structural variables. These require more insight, imagination, and ingenuity, but these qualifications are not limited to the capable few doing intensive community studies.
- 5 In developing the model, as well as in the actual analysis, we should be guided by the ideas presented by Blalock, Hermalin, Holt, and Lesthaeghe, among others. The rather simple-minded models used so far probably have influenced both the selection of variables and the analysis.

Appendices

Appendix A — List of Participants in the Seminar

Dr M. Alauddin	University of Dhaka
Mr A. Al-Kabir ^a	Bangladesh (London School of Hygiene and Tropical Medicine)
Dr R. Anker	International Labour Organization
Dr J. Bernedo ^a	Dirección General de Empleo, Peru
Dr R. E. Bilsborrow	University of North Carolina at Chapel Hill
Prof H. M. Blalock	University of Washington, Seattle
Mr E. Borja ^a	Instituto Nacional de Estadística y Censos, Ecuador
Prof W. Brass	London School of Hygiene and Tropical Medicine
Dr M. Cain	Population Council
Prof J. C. Caldwell	Australian National University
Ms P. Caldwell	Australian National University
Dr J. B. Casterline	WFS
Dr N. Chayovan	Chulalongkorn University, Bangkok
Mr V. C. Chidambaram	WFS
Mr J. G. Cleland	WFS
Mr I. M. Eid ^a	Central Agency for Public Mobilisation and Statistics, Egypt
Dr L. T. Engracia	National Census and Statistics Office, Philippines
Prof R. Freedman	University of Michigan
Prof A. I. Hermalin	University of Michigan
Dr A. G. Hill	London School of Hygiene and Tropical Medicine
Mr J. N. Hobcraft	WFS
Prof D. Holt	University of Southampton
Dr G. Hugo	The Flinders University of South Australia
Mr M. Kibet	Central Bureau of Statistics, Kenya
Prof R. Lesthaeghe	Interuniversity Programme in Demography, Brussels
Dr G. McNicoll	Population Council
Ms E. Naulleau ^a	WFS
Ms R. A. Njeck ^a	Direction de la Statistique et de la Comptabilité Nationale, Cameroon
Dr M. Nizamuddin	UNDP, Egypt
Dr S. O. Rutstein ^a	WFS
Ms L. Tiapani ^a	Direction de la Statistique, Ivory Coast
Dr A. O. Tsui	University of North Carolina at Chapel Hill
Mr C. Vanderhoeft	Interuniversity Programme in Demography, Brussels
Prof E. van de Walle	University of Pennsylvania
Dr V. Verma	UN Statistical Office
Mr C. Welte-Chanés	Universidad Nacional Autónoma de México
Ms L. H. Werner	Central Bureau of Statistics, Kenya
Mr A. Westlake ^a	WFS

^aAlso participant in WFS Workshop on Community Factors in Infant and Child Mortality.

Appendix B — Programme for the Seminar

Day and Date	Time	Session		Chairman	Comments/ overview	Papers	
		No	Title			Author(s)	Title
Monday 20 April	09.30	—	Opening remarks	H. Gille	—	—	—
		I	Overview of findings from the analysis of WFS community data	V. C. Chidambaram	—	—	—
10.00–15.15							
						M. Alauddin	Community factors in contraception among Bangladeshi rural women
						L. T. Engracia	Community effects on contraception in the Philippines
						R. Lesthaeghe,	Individual and contextual effects of education on proximate fertility
						C. Vanderhoeft,	determinants and life-time fertility
						S. Becker and	in Kenya
						M. Kibet	Community effects on fertility
						J. B. Casterline	Community effects on contraceptive use
						A. O. Tsui	Community effects on infant and child mortality: findings from six countries (verbal presentations)
15.30–17.30							
						Workshop staff and participants:	
						S. O. Rutstein	
						E. Naulleau	
						A. Westlake	
						A. Al-Kabir	
						J. Bernedo	
						E. Borja	
						I. M. Eid	
						R. A. Njeck	
						L. Tiapani	

Day and Date	Time	Session		Chairman	Comments/ overview	Papers	
		No	Title			Author(s)	Title
Tuesday 21 April	09.30-13.00	II	The nature of community effects and their empirical investigation	A. G. Hill	G. McNicoll	E. van de Walle	Community-level variables and institutional factors in the study of nuptiality
						A. I. Hermalin	Integrating individual and community data in the study of contraceptive behaviour
						J. C. Caldwell and P. Caldwell	Factors other than nuptiality and contraception affecting fertility.
						J. N. Hobcraft G. Hugo	Mortality Migration
Wednesday 22 April	09.30-11.00	III	Issues of sample design and data analysis	A. Westlake	D. Holt	V. Verma	Sample design
						H. M. Blalock	Cross-level analyses
	11.30-16.00	IV	Collecting community data	R. Lesthaeghe	W. Brass	M. Cain	Intensive community studies
						N. Chayovan and J. Knodel	Improving the collection of village-level data: an experience from Thailand
						L. H. Werner	Creating community-level data: experiences in Kenya
						M. Nizamuddin	WFS community data

Day and Date	Time	Session		Chairman	Comments/ overview	Papers	
		No	Title			Author(s)	Title
Thursday 23 April	16.30–17.30	V	Instruments for collecting community data Plenary	J. Cleland	R. Freedman	R. E. Bilsborrow	Collecting community-level data for fertility analysis
	09.30–12.30		Working groups:				
			1 Economic characteristics				
			2 Political and administrative structure				
	14.00–17.00		3 Service provision				
			4 Social structure and normative context				
			5 Sample design issues				
			Plenary				(Verbal presentations from Working Groups)
	17.00	–	Concluding remarks	–	–	–	–

Appendix C — Working Groups: Composition

GROUP I: ECONOMIC CHARACTERISTICS

M. Alauddin
R. Anker, Chairman
R. E. Bilsborrow
E. Borja
M. Cain
A. G. Hill
H. Jemai
S. O. Rutstein
T. Harpham, Rapporteur

GROUP II: POLITICAL AND ADMINISTRATIVE STRUCTURE

P. Caldwell
V. C. Chidambaram, Chairman
J. G. Cleland
I. Eid
R. Freedman
G. McNicoll
L. Tiapani
E. van de Walle
G. Santow, Rapporteur

GROUP III: SERVICE PROVISION

W. Brass
E. Carrasco
N. Chayovan
A. I. Hermalin
J. N. Hobcraft, Chairman
E. Jones
A. Al-Kabir
M. Kibet
A. O. Tsui
L. H. Werner
R. E. Lightbourne, Rapporteur

GROUP IV: SOCIAL STRUCTURE AND NORMATIVE CONTEXT

H. M. Blalock
J. C. Caldwell
J. B. Casterline, Chairman
G. Hugo
R. Lesthaeghe
E. Naulleau
R. A. Njeck
C. Welte-Chanés
J. Verrall, Rapporteur

GROUP V: SAMPLE DESIGN ISSUES

J. Bernedo
L. T. Engracia
D. Holt, Chairman
M. Nizamuddin
C. Vanderhoeft
V. Verma
A. Westlake
A. M. Marckwardt, Rapporteur

Appendix D — Working Group Reports

GROUP I: ECONOMIC CHARACTERISTICS OF THE COMMUNITY

It was agreed at the beginning of the working group session that, regardless of theoretical perspectives or particular ideologies, the organization of the economy is important in the study of fertility. However, it was felt that the major goal of the working group, which was to make recommendations about the economic content of community questionnaires, was particularly difficult if no explicit theoretical standpoints were taken. Given the brief time allotted to the group, and the diversity of theoretical viewpoints of group members, it was agreed that progress could best be made by breaking down the concept of 'economic structure' into several broad dimensions. By doing so, important economic factors were less likely to be omitted. In the exercise, no effort was made to restrict attention to factors best measured at the community level, but rather to identify the full set of pertinent factors and then to consider the level of data collection. The typology agreed upon consisted of:

- 1 The means and social relations of production, broken down into land, labour, and capital.
- 2 Transportation, communication, and mobility.
- 3 Economic institutions and development programmes.
- 4 Physical environment.

It was acknowledged that the categories are not mutually exclusive when it comes to analysis.

The topics proposed for inclusion within each category are as follows.

The means and social relations of production

- 1 Goods and services produced. Crops, animal products, handicrafts and other non-agricultural products.

- 2 Inputs to production.
 - (a) Labour location of employment: home or away from home.
 - (b) Category of employer: self, family, small-holder, large-holder.
 - (c) Distance to work.
 - (d) Time spent at work.
 - (e) Wage rates.

This information should be gathered for men, women, and children.

The relevant geographical area is larger than the village, because people may go out of their village to work. Conditions in the vicinity of the community are important. A relevant question is, what are the opportunities for non-farm employment (in the home, within commuting distance, or as seasonal work in other localities)? This emphasis is of particular relevance in the urban sector.

- 3 Land. Distribution, cropping patterns, output per acre, prices, ownership and use, property rights, inheritance patterns, rents, form of rent payments (cash, product, labour).
- 4 Capital and technology. Amount of capital in irrigation, mechanization, fertilization. Land sales, credit relationships. (It is probably possible to obtain information on formal credit arrangements only.) Open-ended questions on historical changes, in particular the impact of the introduction of new technologies.
- 5 Supply of purchased inputs. Quantities, form of payment, location of supply points.

There are many difficulties in measuring most of these items at the community level. The individual questionnaire needs to be well organized to obtain information about economic activities. For most of these variables information on changes over time is important. This information is difficult to gather; the working group was not able to pursue this problem in detail.

Transportation, communication, and mobility

- 1 Distance, frequency, cost, and schedules for the various means of transport which are most commonly used for travel to towns.
- 2 Communications: telephones, mail service, newspapers, radio, television. Availability and prices.
- 3 Mobility: commuting and permanent migration of community members. Broken down by age and sex.

It is desirable to have this information for the time of survey and five years before the survey.

Economic institutions and development programmes

Included is information about credit unions, labour unions, co-operatives, veterinary and farm extension services, training and apprenticeships, inter-generational contracts.

Physical environment

- 1 Agro-climatic features: rainfall, soil type, topography, temperature, proximate bodies of water, water table level, forestation.
- 2 Disasters: earthquakes, hurricanes, pestilence.

Data on all of the above topics would be useful as background material and would potentially assist explanatory analyses as well. But the measurement problems are challenging. Which of these topics are most suitable to approach in community-level inquiry is a question not definitively resolved in the working group discussion. Furthermore, the pertinent topics clearly differ between countries. There was a nagging feeling that the importance of intra-community differences outweighs inter-community variation. Finally, it was agreed that urban sectors could and should be brought into the analysis, and that measurement of temporal change is very important although difficult.

GROUP II: POLITICAL AND ADMINISTRATIVE STRUCTURE

The consensus of the group is that it is worthwhile to collect information from key people in the community, either alone or in various groups. The group also agreed that these key people should be selected both according to official title and through identification by individual residents of the community. It is essential to be very clear on the purpose of the investigation. In particular, with reference to a demographic survey, the nature of the information collected and the manner in which it is collected is highly dependent on whether or

not an official population and family planning policy exists. The case for investigation is just as strong if an official policy is absent. That is, more is of interest than simply the impact of a national family planning programme. Indeed, government policies outside the immediate field of population, at the national and local level, can impinge on individual reproductive motivation and behaviour.

At this point it is more appropriate to establish a rationale for collecting the data, and a conceptual framework, than to devise a questionnaire. Indeed, researchers will have to be extremely flexible in devising research instruments, as the instruments must be strongly linked to local conditions. On the basis of the experiences of the members of the group and the discussions during the seminar, six broad areas of interest are delineated. They are presented in no special order of priority.

Isolation

How closely tied to central arms of the government is the community of study? What is the nature of the integration in national networks? Inquiry here must concern roads, transport, and communications, among other topics.

Strength of leadership

The interest here is primarily local leadership, but the strength of ties between the locality and the national government are also relevant. What is the local role of bureaucrats and other government employees? The objective is to assess whether they act as official agents of government policy.

Pluralism of the community

It is important to determine whether there are different subgroups with different aspirations and differential access to services. The subgroups can consist of castes, or ethnic and language groups. A basic question is whether the leaders of these groups share common policy objectives.

Locus of political power

The fundamental issue is the division of political power among institutions. In some settings, the nature of the division of power and respect between religious institutions and the state is relevant. Division of power at the national level and also within the community of study are both of interest. Other pertinent questions are: Does local political activism play any role in ensuring the efficiency of, say, health and family planning

programmes? Do politicians or religious leaders play any role? Do local officials represent the community, or subgroups within the community, or do they implement the instructions of the central government.?

Transfer of social responsibility to the state

At issue is the extent to which the State has taken over responsibility for support of the aged, policing the locality, the settling of disputes, disaster relief, health care, child care, education, and so forth.

Local elites

What positions do they take with respect to government programmes? Are they recognized as elites primarily because they serve as official government representatives?

More detailed work is needed to create sensitive research instruments. Any instruments developed will require careful exploratory pre-tests before employing them in large-scale surveys.

GROUP III: SERVICE PROVISION

At the beginning of the group's discussion, it was agreed that it would be most fruitful to concentrate on the issue of provision of family planning services. The group also agreed to consider the measurement of all relevant aspects of provision of family planning services, to gain perspective on the contribution, if any, of data collected in a community survey beyond what can be gathered in a household survey.

Proximity of services

The group agreed on two major points. First, in rural areas, many sampling clusters are geographically too large for a single global measurement to represent accurately time or distance between individual respondents' doorsteps and specific facilities. Urban clusters, on the other hand, tend to be compact. Secondly, if the cluster is geographically compact, the distance from the centre of the cluster to the closest facility is an adequate approximation of the objective distance confronting individual household members.

Matters are considerably complicated, however, where individuals may choose among different outlets. There has been perhaps too much emphasis on measuring the distance from households or clusters to the nearest facility. A more useful, though more difficult, approach is to ascertain the distance to the facility closest to a nodal point (for example a market,

or a bus stop) on a respondent's normal travel path. There is no reason to believe that travel time or distance from home to the nearest facility is a valid measure of the convenience of the location of family planning outlets from the standpoint of individual women.

Despite these objections to relying on proximity of the nearest facility, several alternative methods of measuring this distance were proposed for surveys where clusters are geographically compact:

- 1 On a scale map showing all roads, mark the centre of the cluster and the location of the nearest facility. The shortest road distance is then taken as the objective distance.
- 2 If there are sufficient respondents per cluster, use the mean of the respondents' reports of distance to the nearest facility as the objective distance. The calculation of the mean can be confined to current users.
- 3 Survey personnel can determine the distance to the facility closest to a particular locality by travelling to the facility, perhaps when interviewing staff members of the facility. Another time to identify local facilities and measure distances would be during the mapping stage of sample design.

Special problems posed by outreach programmes

In measuring the accessibility of family planning services, the activities of door-to-door canvassers or mobile teams is often left unmeasured. Measuring such activities can be difficult, since respondents (in individual or community surveys) may be unaware of visits to the community, or of the agency affiliation of the visiting individuals or teams, or may find it hard to recall enough detail about the frequency of visits or the recency of the last visit. Records based on schedules or logs kept by field personnel offer an alternative source of data, but these may contain overstatement, or be too vague to convey the actual extent of activity.

There was agreement that visits to the community by outreach programmes are best treated as global community variables, applying to all respondents. Items of special interest include the time elapsed since the last visit by workers in particular programmes and the overall frequency of visits, both to be determined either from interviews with local residents or from programme records.

If the programme records are of good quality and detail, additional variables which might be obtained from the records include items such as duration of the programme in the locality and number of clients served.

Knowledge and convenience of supply sources

Where facilities exist but few women know about them, utilization of the facilities will be low. Moreover, the more supply outlets women are aware of, the more likely some will be conveniently located in terms of normal travel patterns. For these reasons, it is proposed that the interviewer in the individual survey be provided with a list of known supply outlets within reasonable travel distance, against which the respondent's knowledge of the existence and distance to the outlets can be compared. The respondent can also be asked about the convenience of visiting each outlet of which she is aware. This approach offers a relatively simple substitute for a mapping of the respondent's actual travel patterns against the location of facilities. The respondent might be asked, in addition, how often she travels to the locations of the facilities.

Type and quality of services

Information on the nature of services offered should be collected both in community and individual surveys.

The community survey data can be gathered in a visit to the facility. One key variable is number of hours open, since in many cases the hours a facility provides a given service may be highly restricted. Other relevant items include the number and qualifications of personnel, types of contraceptive methods offered, costs of contraceptive methods offered, and amount of supplies on hand. A final dimension sometimes of importance is the freedom to choose the outlet, or to switch from one outlet to another. Some programmes require clients to use a particular facility (determined by place of residence), which, especially for employed women, may not be the most convenient one.

In the individual survey, the respondent can be asked about the perceived quality of services provided (for past and current users, phrased in terms of recent experiences), including: overall quality rating; hours of service; waiting time; types of services offered; competence of personnel; politeness of personnel.

Temporal change

It was agreed that historical information about service availability should be gathered at the community level and treated as global community data. Pertinent items include: how long the service has been available; changes in methods offered; whether there have been chronic supply difficulties at times. Where adequate records have been kept, it may be possible to determine the length of time a particular facility has been open on the basis of records kept in central offices rather than from interviews in the locality.

In interviews in the locality, temporal change may be captured more accurately by asking questions in reference to a particular time point, such as 'five years ago'. For example: 'If someone in this village became seriously ill five years ago, where could he go for medical care?'; or, 'Five years ago, where did women go for family planning supplies?'. Obviously it is essential that any such questions be directed to individuals who have lived in the locality a sufficiently long time.

GROUP IV: SOCIAL STRUCTURE AND NORMATIVE CONTEXT

The group agreed that many of the critical features of the social and normative structure of communities cannot be easily captured in one-visit or short-term community surveys. Nevertheless, several promising data collection approaches were proposed.

(1) Data on the ethnic and religious composition of the community can be obtained in interviews with community members and can be extremely useful in defining the cohesiveness of the social and normative structure.

(2) In interviews with key local religious and political leaders, their views can be obtained on matters directly related to reproduction, such as the acceptability of family planning programme activities and the optimal family size for couples, and on matters less directly related to reproduction but still of potential relevance, such as their relations with activities and institutions of the central government. These views will, in some societies, affect the receptivity of individual community members to family planning. It is crucial to probe beyond formal or official views to the attitudes actually expressed by local leaders during their routine activities in the community.

(3) Individuals' perceptions of the views, and behaviour, of community leaders is one mechanism for normative influence on individual decisions. In individual interviews, respondents can be asked their perceptions of the attitude of religious or political leaders about optimal family sizes and use of contraception. Similarly, respondents can be asked about the perceived attitudes and behaviour of neighbours and friends.

(4) One means of measuring norms is to ask a variety of informants in the community about the social consequences of certain behaviours: delayed marriage or celibacy; extra-marital conceptions and births; use of contraception (with reference to specific methods); induced abortion; use of breastfeeding substitutes; child neglect (leading to inadvertent child death). With respect to each of these behaviours, two

questions are of interest: First, is the behaviour viewed as acceptable or unacceptable, moral or immoral? Secondly, what actions would be taken against the individuals perpetrating these behaviours? One strategy is to ask about the most recent known episodes of such behaviour: what action, if any, was taken against the individual(s) involved?

(5) Changes in norms regarding reproductive behaviour are of special interest. One source of indicators of change are responses to a set of questions similar to those proposed in (4) asked in reference to times in the past, in interviews with older persons in the community. Comparison of the responses about the past and present provides an indication of change. Alternatively, community members can be asked directly whether norms and sanctions applied to certain types of behaviour have changed.

(6) Migration of community members, either temporary or permanent, can have a disruptive impact on the social and normative structure. Thus measurement of levels of migration are relevant in this context. This can be achieved through household inquiry, where the sample provides a large number of sampled households per community, or by addressing global questions about migration levels to community informants.

GROUP V: SAMPLE DESIGN ISSUES

General considerations

- 1 In the discussion of sampling units, it is necessary to assume that communities are defined areally, or are related to areal units in some sense.
- 2 Four types of variables can be distinguished: individual-level, aggregated individual-level (contextual), global (collected at the community level), and external (at the global level). Their relative importance in the research will influence the sample design.
- 3 In general, community-level data are analysed at the individual level, thereby avoiding problems of aggregation bias.

Relationship between sampling units and communities

- 1 It is preferable that communities, however defined, do not cut across boundaries of sampling units.
- 2 In rural areas, communities usually coincide with, or are part of, the ultimate area units (UAUs) of the sample. If they are subdivisions of UAUs, it is critical that provision be made for coding a separate

community identification number. Data in this case should be collected at the level of the community, not the larger UAU.

- 4 In urban areas, UAUs are almost always arbitrarily demarcated blocks. Meaningful communities are likely to be much larger than the UAUs, for example they may be large neighbourhoods. Where possible and feasible, it is desirable that these neighbourhoods form strata for sample selection.
- 4 Generally urban sample frames do not have the necessary sociological information for identifying communities. In this case, it is useful if UAUs do not cross administrative units. This permits the introduction of pre-existing global variables from administrative sources.
- 5 Otherwise, in urban areas it may be better to rely more on contextual variables (aggregated individual data), assuming that the UAUs are not entirely devoid of meaning as communities in a sociological sense. Global variables are more difficult to define and collect.
- 6 Careful mapping can have a pay-off in providing useful global variables in both urban and rural areas. Examples of relevant variables include physical size of the community, population size, and distance to specific types of facilities.

Dependency of the design on the types of community variables desired for analysis

- 1 If global variables are of higher priority, then it is desirable to have relatively more clusters and a relatively smaller take per cluster.
- 2 If aggregated (contextual) variables are more important, larger cluster sizes are required. This has certain costs: fewer communities for an overall fixed sample size, and larger design effects. The magnitude of the design effects will vary depending on the nature of the variables under consideration. In the assessment of WFS practice, we have concluded that many WFS samples were less clustered than would be recommended according to criteria of cost and statistical efficiency. This suggests that there is some margin for increasing the take per cluster.
- 3 In situations where the survey design calls for use of an expanded household sample for collection of basic demographic data, aggregated variables should be constructed from variables collected at this stage, if possible. This will allow the individual sample to remain relatively unclustered, while providing a sufficiently large sample take per cluster for the aggregated variable.

Other issues

- 1 While it is possible to design samples in which the multi-collinearity of community variables is reduced, through deliberate stratification by community variables (as suggested by D. Holt, in comments to the Seminar), it is not worthwhile to do so if wide departures from self-weighting result.
- 2 Multi-round surveys, long-life sampling frames, and integrated survey programmes all offer increased opportunities for gathering community data. The community data should be collected at each survey or survey round. This will provide the opportunity for capturing changes in community characteristics and to relate these to other phenomena.
- 3 We have assumed that communities are not units of analysis. If they are, and if they have been selected with probability proportional to size (PPS), then selection probabilities must be taken into account.
- 4 For individual-level analysis, PPS selection of communities does not as such affect the conclusions which are drawn from statistical analysis, with respect to the effects of individual or community variables.

